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THE CLIMATIC ZONES AND THEIR SUBDIVISIONS.*

BY

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(SYNOPSIS.)

Classification by latitude circles: the five classic zones; *Clima* as used by the Greeks; Ptolemy's climates; Parmenides; Polybius; Posidonius; Aristotle; Eudoxus; Strabo; Hippocrates.—Temperature zones: Supan; Köppen; Gebelin.—Wind zones: Davis; Woeikof.—Summary and conclusions.—Necessary subdivisions of the zones.

Classification by Latitude Circles.—So great is the variety of climates to be found in different parts of the world that it has long been customary to classify these climates roughly into certain broad belts. These are the climatic zones. A simple grouping of this kind can, however, obviously take account only of the most general characteristics of the climates which are included within each zone. The five zones with which we are most familiar are the so-called torrid, the two temperate, and the two frigid zones. The torrid, or better, the tropical zone, naming it by its boundaries, is limited on the north and south by the two tropics of Cancer and Capricorn, the equator dividing the zone into two equal parts. The temperate zones are limited towards the equator by the tropics, and towards the poles by the Arctic and Antarctic circles. The two frigid, or better, the two polar zones, are caps covering both polar regions, and bounded on the side towards the equator by the Arctic and Antarctic circles.

* The following books have been made use of, in addition to the references mentioned in the foot-notes:

W. M. Davis: Elementary Meteorology, 334-335.
J. Hann: Handbuch der Klimatologie, II, 3-9.
W. Köppen: Klimalehre, 104-106.
A. Woeikof: Die Klimate der Erde, 327.

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These five zones are classified on purely astronomical or mathematical grounds. They are really zones of sunshine, or of solar climate. Within the tropical zone the sun reaches the zenith at two different times in the year; its greatest possible zenith distance is 47°; the day is never less than ten and a half hours long. On the tropics themselves, the sun reaches the zenith but once a year. In the polar zones the sun is below the horizon for twenty-four hours at least once in winter, and is above the horizon for the same length of time at least once in summer. On the polar circles the noon altitude of the sun decreases to 0° on the shortest day. The temperate zone has conditions between these two extremes. At no point can the sun be in the zenith; nor, except on the polar circles, is there ever anywhere a twenty-four hour day or night.

The tropical zone has the least annual variation of insolation. It has the maximum annual amount of insolation. Its annual range of temperature is very slight. It is the summer zone. Beyond the tropics the contrasts between the seasons rapidly become more marked. The polar zones have the greatest variation in insolation between summer and winter. They also have the minimum amount of insolation for the whole year. They may well be called the winter zones, for their summer is so short and cool that the heat is insufficient for most forms of vegetation, especially for trees. The temperate zones are intermediate between the tropical and the polar in the matter of annual amount and of annual variation of insolation. Temperate conditions do not characterize these zones as a whole. They are rather the seasonal belts of the world. These five zones further differ more or less from one another in the character of their animals and plants and in the conditions of human life within their boundaries.

Taking the area of a hemisphere as unity, the relative areas of these zones are as follows:

Tropical	0.40
Temperate	0.52
Polar	0.08

This subdivision of the earth's surface on the basis of the geometrical distribution of sunshine dates from the time of the early Greek philosophers and geographers, but it is impossible to determine with certainty just when and by whom the various suggestions in this connection were made.*

* Hugo Berger: *Geschichte der wissenschaftlichen Erdkunde der Griechen* (ad Ed. Leipzig, 1903), gives a discussion of the history of zonal classifications among the Greeks. See also H. Kiepert: *Lehrbuch der alten Geographie, Berlin*, 1878.

The word *clima* as used by the Greeks originally referred to the supposed slope of the earth toward the pole. It later came to be used, probably after Aristotle's time, as about equivalent to our *zone*, but did not at first have the same meaning as that word has with us. It was simply a mathematical or an astronomical term, and was not associated with any idea of physical climate. A change of location, to a place where the day was half an hour or an hour longer than at the starting-point, meant in those days a change of *climate.* Change of latitude was, however, gradually seen to mean change of temperature as well as change in length of day, and thus the word *clima* came to have its present meaning.* The division into climates was first applied to the northern hemisphere only, as there was no practical knowledge of the southern hemisphere.

An excellent illustration of the ancient meaning of the word *clima* is found in the system of climates proposed by the famous geographer Ptolemy, who lived in the second century A.D. Ptolemy used different schemes at different times, but the essential was a division of the earth's surface between equator and north pole into a series of climates, or parallel zones, separated by latitude circles and differing from one another simply in the length of their longest day. In the lower latitudes the breadth of a *clima* was fixed by the difference of a quarter of an hour in the length of the longest day, but in higher latitudes differences of half an hour, an hour, and finally a month, were the determining factors. Ptolemy's subdivision of the earth's surface was really nothing but an astronomical climatic table.†

Parmenides, who flourished about the middle of the fifth century B. C. proposed a five-zone division of the earth's surface not very unlike our present system. These zones were a torrid zone, uninhabitable because of heat; two frigid zones, uninhabitable because of cold; and two intermediate zones, of moderate temperature, suitable for man. The exact limits assigned to these zones are not known with certainty; but it is reasonable to suppose that the Arctic circle was even then recognized as a natural boundary for the north polar zone, and it is pretty clear that the temperate zone was much smaller, and the torrid zone much larger, than in our present classification. (See Fig. 1.‡)

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*Century Dictionary.

†F. A. Ukert: *Geographie der Griechen und Römer von den frühesten Zeiten bis auf Ptolemäus* (Weimar, 1816), Vol. 1, Part 2, p. 187, gives a tabulated scheme of Ptolemy's climates. See also Encyclopædia Britannica, article *Climate.*

‡From H. Berger: *Geschichte der wissenschaftlichen Erdkunde der Griechen.* 2d Ed., Leipzig, 1903, p. 211.

The exact boundaries of the different zones varied more or less for some time, as astronomical knowledge became more and more exact, and as the habitable area of the earth's surface was gradually extended, but the scheme was generally adopted by later writers. Polybius (born about B. C. 204), however, divided his torrid zone into two parts by the equator, and Posidonius (born about B. C. 135) divided his torrid zone into three parts, making six and seven zones respectively. Aristotle (born B. C. 384) limited the torrid zone by the tropics and the north temperate zone by the Arctic circle, but there is doubt whether he really meant the fixed Arctic circle which we know. He believed both temperate zones habitable,* thus limiting the uninhabitable area to the astronomical tropical zone. Eudoxus, of Cnidus, who lived about B. C. 366, used a division of a quadrant of the earth's circumference into fifteen parts, of which four belonged to the torrid, five to the temperate, and six to the frigid zone. The Tropics were thus fixed at latitude 24°. Strabo (born about B. C. 54), opposed the prevailing view that the whole torrid zone, between the tropics, was uninhabitable, and also first clearly set forth the opinion that the temperature decreases with increasing altitude above sea-level, as well as with increasing latitude. As early as about 400 B. C., Hippocrates had endeavoured to show a causal relation between sunshine and the topography of a district on the one hand and the characteristics of its inhabitants on the other.†

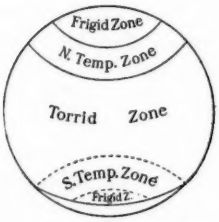

FIG. 1.—THE ZONES IN THE TIME OF PARMENIDES.

Temperature Zones.—The classification of the climatic zones on the basis of the geometrical distribution of sunshine serves very well for purposes of simple description, but a glance at any isothermal chart shows at once that the isotherms do not coincide with the latitude lines. In fact, in the higher latitudes, the former often follow the meridians more closely than they do the parallels of latitude. The astronomical zones—*i. e.*, the zones of light—therefore differ a good deal from the zones of heat. Hence it has

* H. F. Tozer: *A History of Ancient Geography*, Cambridge, 1897, 179–180.

† The older views regarding the climates and the habitability of the five zones were thus stated by Virgil (Georgics I, 233–239, Translation by Davidson): "Five zones embrace the heavens; whereof one is ever glowing with the bright sun, and scorched forever by his fire; round which the two furthest ones to the right and left are extended, stiff with cerulean ice and horrid showers. Between these and the middle zones, two by the bounty of the gods are given to weak mortals; and a path is cut through both, where the series of the signs might revolve obliquely."

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naturally been suggested that the zones be limited by isotherms rather than by parallels of latitude, and that a closer approach be thus made to the actual conditions of climate.

Supan* (see Fig. 2) has suggested limiting the hot belt, which corresponds to, but is slightly greater than, the old torrid zone, by the two mean annual isotherms of 68°—a temperature which approximately coincides with the polar limit of the trade winds and with the polar limit of palms. The latter is considered by Grisebach to be the truest expression of a tropical climate. The hot belt widens somewhat over the continents, chiefly because of the mobility of the ocean waters, whereby there is a tendency towards an equalization of the temperature between equator and poles in the oceans,

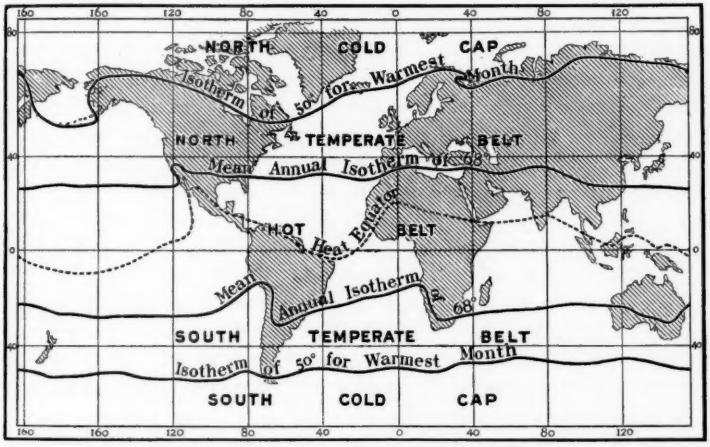

FIG. 2.—TEMPERATURE ZONES AFTER SUPAN (1896).

while the stable lands acquire a temperature suitable to their own latitude. Furthermore, the unsymmetrical distribution of land in the low latitudes of the northern and southern hemispheres results in an unsymmetrical position of the hot belt with reference to the equator, the belt extending further north than south of the equator. The polar limits of the temperate zones are fixed by the isotherm of 50° for the warmest month. This is a much more satisfactory limit than the mean annual isotherm of 32°, which has also been suggested, for climates differing very widely from one another are found to have the same mean annual temperature of 32°. Summer heat is more important for vegetation than winter cold, and

* A. Supan: *Grundzüge der physischen Erdkunde.* Leipzig, 1896, 74-77.

where the warmest month has a temperature below 50°, cereals and forest trees do not grow, and man has to adjust himself to the conditions in a very special way. The two polar caps are not symmetrical as regards the latitudes which they occupy. The presence of extended land masses in the high northern latitudes carries the temperature of 50° in the warmest month farther poleward there than is the case in the corresponding latitudes occupied by the oceans of the southern hemisphere, which warm less easily and are constantly in motion. Hence the southern cold cap, which has its equatorial limits at about lat. 50° S., is of much greater extent than the northern polar cap. So far as this south polar zone is concerned, the presence or absence of an Antarctic continent is immaterial; for such a land mass must be ice-covered, and hence cannot operate to raise the temperature as in the case of a land surface to which the sun's rays have immediate access. The northern temperate belt, in which the great land areas lie, is much broader than the southern, especially over the continents. These temperature zones emphasize the natural conditions of climate more than can be the case in any subdivision by latitude circles, and they bear a fairly close resemblance to the old zonal classification of the Greeks.

Another, much more detailed classification, also proposed by Supan* (see Fig. 3), is as follows:

A. A warm zone, between the mean annual isotherms of 68°. This is subdivided into (*a*) a tropical belt, bounded on the north and south by the isotherm of 68° for the coldest month; (*b*) an extra-tropical belt, between the isotherm of 68° for the coldest month and the mean annual isotherm of 68°.

B. A temperate zone between the mean annual isotherms of 68° and 32°. This is subdivided into (*a*) the equatorial belt of the temperate zone, between the mean annual isotherms of 68° and the isotherm of 32° for the coldest month; (*b*) the polar belt of the temperate zone, beyond the isotherm of 32° for the coldest month.

C. A cold zone, on the polar side of the mean annual isotherm of 32°, characterized by permanently frozen ground. This is subdivided into (*a*) the equatorial belt of the cold zone, between the mean annual isotherm of 32° and the isotherm of 32° for the warmest month; (*b*) the polar belt of the cold zone, on the polar side of the isotherm of 32° for the warmest month.†

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* A. Supan: *Die Temperaturzonen der Erde*, Peterm. Mitth., XXV, 1879, 349–358.

† It may be noted that the isotherm of 32° is not found at sea-level in the July isothermal chart of the north polar regions (*Atlas of Meteorology*, Pl. 4). The isotherms in Fig. 3 are reproduced as originally drawn by Supan, and have not been changed to accord with recent observations.

The temperate zone, in this scheme, is smaller than that between the tropics and the polar circles. Both the other zones are larger than in the classic divisions. The ratio of the warm zone as a whole (*i. e.*, in both hemispheres), as compared with the temperate and cold zones in each hemisphere, is about as follows: Warm zone, 8; temperate zone, 3; cold zone, 1. As Hann has pointed out,* these temperature zones are no less unfortunately named in the higher latitudes than are the classic zones, for the reason that the mean annual temperature in a marine climate has a very different climatic significance from that of the same temperature in a continental climate. For example, southeastern Siberia and the larger portion

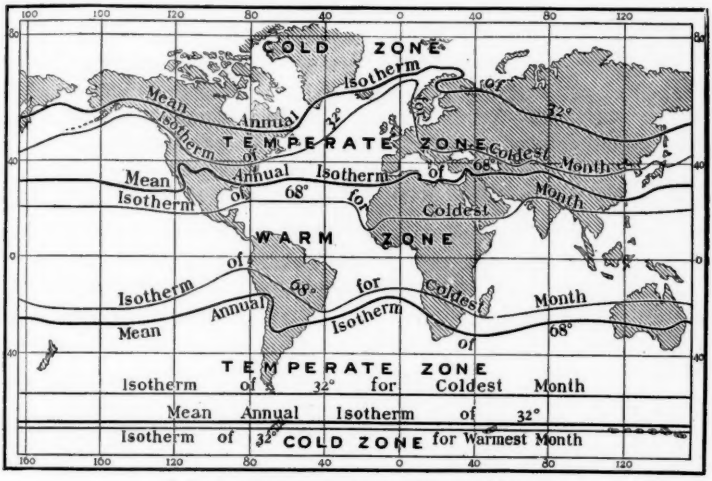

COLD ZONE
Mean Annual Isotherm of 32°
TEMPERATE ZONE
Isotherm of 32° for Coldest Month
Mean Annual Isotherm of 68°
WARM ZONE
Isotherm of 68° for Coldest Month
Mean Annual Isotherm of 68°
TEMPERATE ZONE
Isotherm of 32° for Coldest Month
Mean Annual Isotherm of 32°
Isotherm of 32° COLD ZONE for Warmest Month

FIG. 3.—TEMPERATURE ZONES AFTER SUPAN (1879).

of the Amoor territory are in the cold zone of Supan, although the summer temperature is higher than in central Germany. In the former region we find lofty forest trees, agriculture and cattle-raising, and in northern Manchuria deciduous forests grow on the lowlands. Again, although this district has the same mean annual temperature as central Greenland, there is the greatest difference in vegetation and in habitability. In high latitudes neither the mean annual temperature nor the temperature of the coldest month is nearly as important a climatic control over vegetation as is the temperature of summer, from the point of view of climate as a whole, and especially in relation to organic life. The summer tem-

* J. Hann: *Handbuch der Klimatologie*, 1897, II, 6–7.

peratures determine habitability, the limits of plant growth, and the general conditions of human life. Hence, in the higher latitudes, zones bounded by mean annual isotherms are no great improvement over zones limited by latitude circles.

Another classification of temperature zones has been suggested by Köppen* (see Fig 4, facing p. 385).

Here the length of time during which the temperature remains within certain fixed limits, these limits having well-marked relations to organic life, is taken into account. Two critical daily mean temperatures, 68° and 50°, and the duration of these temperatures for periods of one, four, and twelve months, are the factors in this classification. These temperatures are not reduced to sea-level. A normal duration of a temperature of 50° for less than a month fixes very well the polar limit of trees and the limits of agriculture. Near this line are found the last groups of trees in the tundras. A temperature of 50° for four months marks the limit of the oak, and also closely coincides with the limits of wheat cultivation. North of the tree limit agriculture ceases, and man's food is to be sought very largely in the sea. With the approach to this line the period of plant growth is shortened more and more, agricultural operations become restricted, and occupations of other kinds are taken up. These critical temperatures and their varying periods of duration form the basis of the following classification:

1. Tropical belt: all months *hot* (over 68°). This is almost altogether within the tropics; it reaches, in round numbers, from latitude 20° N. to 16° S.

2. Sub-tropical belts: 4 to 11 months hot (over 68°); 1 to 8 months *temperate* (50°–68°).

3. Temperate belts: 4 to 12 months temperate.

4. Cold belts: 1 to 4 months temperate; the rest *cold* (below 50°).

5. Polar belts: all months cold.

The temperate belts of both hemispheres are further subdivided into three districts†—the steadily temperate belt‡ is found only on the oceans; the belt of hot summers§ only on the continents, and the third, with moderate summers and cold winters,** extends

* W. Köppen: *Die Wärmezonen der Erde, nach der Dauer der heissen, gemässigten und kalten Zeit und nach der Wirkung der Wärme auf die organische Welt betrachtet.* Met. Zeitschr., I, 1884, 215-226. Chart.

† All characterized by having at least four months temperate (50°–68°), and not more than four months hot (over 68°).

‡ No month over 68° or below 50°.

§ Has temperatures below 50° for one or more months.

** Has less than four months, but not less than one month, temperate (50°–68°).

around the world, with the exception of a notable interruption over Siberia.

In the second of these subdivisions, except in eastern North America and Asia, the rainfall is generally deficient; irrigation is more or less necessary, and deserts and steppes characterize the continental portions. Only in the monsoon districts of southern and eastern Asia, of Brazil, and of southeastern North America, do we find high temperatures combined with high relative humidity. The third subdivision above noted is now the chief seat of human development. Over a large part of the cold belt of the northern hemisphere the ground is permanently frozen, only thawing a little on the surface in summer. Nevertheless, in portions of it trees and hardy cereals grow. The polar belts are, as a whole, outside the limits of tree growth.

Another suggestion has been made by Gebelin,* who has proposed to select, as limits of the temperate zone, certain visible geographical boundaries, in contrast with the ideal climatic limits based upon the distribution of sunshine. On the oceans, the tropical circles serve as acceptable boundaries on the sides towards the equator, but on the continents the desert belts on both sides of the tropics are reasonable limits, although these deserts do not reach the eastern coasts of the continents. For the polar limits of the temperate zone the tundras are chosen on the continents, and the summer ice-masses on the oceans.

Wind Zones.—While a simple classification of the zones on the basis of temperature is an improvement upon any rigid scheme of division by latitude circles, the heat zones emphasize the element of temperature to the exclusion of such important elements as winds and rainfall. So distinctive are the larger climatic features of the great wind belts of the world, that a classification of climates according to wind systems has been suggested.† As the rain-belts of the world are closely associated with these wind systems, a classification of the zones by winds also emphasizes the conditions of rainfall. In such a scheme, the torrid, or tropical, zone, with its regularity of weather through the year, and the comparative simplicity of its climatic features, is bounded on the north and south by the margins of the trade-wind belts, and is therefore larger than the classic torrid zone. This trade-wind zone is somewhat wider on the eastern side of the oceans, and properly includes within its

* J. Gebelin. *Les Limites géographiques du climat tempéré.* Communication faite au Congrès National des Sociétés françaises de Géographie le 6 Août, 1895. Bordeaux, 1896.

† W. M. Davis. *Elementary Meteorology.* Boston, 1894, 334–335.

limits the equable marine climates of the eastern margins of the ocean basins, even as far north as latitude 30° or 35°. Most of the eastern coasts of China and of the United States are thus left in the more rigorous and more variable conditions of the north temperate zone. Through the middle of the trade-wind zone extends the subequatorial belt, with its migrating calms, rains, and monsoons. On the polar margins of the trade-wind zone lie the subtropical belts, of alternating trades and westerlies. The temperate zones, with the great irregularity of their weather phenomena and their marked seasonal changes, embrace the latitudes of the stormy westerly winds, having on the equatorward margins the subtropical belts, and being somewhat narrower than the classic temperate zones. Towards the poles there is no obvious limit to the temperate zones, for the prevailing westerlies extend beyond the polar circles. These circles may, however, serve fairly well as boundaries, because of their importance from the point of view of insolation. The polar zones in the wind classification, therefore, remain just as in the older scheme.

A compromise between the rigid division by latitude circles and the isothermal and wind classifications has been suggested by Woeikof,* who objects to limiting the torrid zone by the tropics on the ground that the high temperatures of that zone, as well as its characteristic winds, extend beyond these parallels. Latitude 30° would be a more natural boundary; but as the westerlies, which are characteristic of the temperate zones, prevail there in winter, latitude 25° is chosen as a compromise between 23½° and 30°. The polar zones are bounded by latitude 65°. When bounded by these several limits, the areas of the different zones are as follows:

Tropical Zone	417
Temperate Zones	490
Polar Zones	93
	1,000

Summary and Conclusions.—Reviewing what has been said regarding the climatic zones, it would seem that, all things considered, a simple division by isotherms, such as that suggested by Supan (1896), is the best for general use. The early division by latitude circles, while it has the merits of great simplicity, and emphasizes the all-important element of sunshine, is too arbitrary, and hence does not accord sufficiently well with the facts of actual

* A. Woeikof. *Die Klimate der Erde*, Jena, 1887, Part 1, 327.

climate. Nevertheless, we should not discard the classic zones without recognizing that they have a real meaning in relation to solar climate. The grouping of the climatic zones according to wind systems has much to recommend it from a meteorological standpoint, but is not quite simple enough for general use. Its adoption involves an understanding of the great wind and calm belts of the world, and of the migration of these belts. The shifting of the boundaries of the torrid zone also brings in an element of uncertainty which is somewhat confusing, although, as a place in the subtropical belt really changes its climate with the seasonal change from westerlies to trades, and *vice versa*, it may reasonably be expected to change its zone. In other words, actual climatic conditions are recognized; and in any case this is a more reasonable plan than to limit the torrid zone by means of the tropics, which arbitrarily cut across the trade-wind belts and separate areas which are climatically the same. The temperature zones proposed by Supan (1879) and by Köppen, while useful in special studies of plant distribution, are too detailed for general adoption.

Whatever climatic zones we adopt, we should certainly abandon the word *temperate* altogether as the designation of the middle zone in each hemisphere, and substitute some such adjective as *intermediate* for it. The words *torrid* and *frigid* should likewise disappear, and be replaced by *tropical* or *equatorial*, and *polar*.

Necessary Subdivisions of the Zones.—However we may classify them, the climatic zones are far from being uniform in character throughout their whole extent. Hence, no brief, simple description of the climate of a zone can be given. For this reason suggestions have been made regarding subdivisions of the different zones. Thus, in the case of the classic north temperate zone it has been proposed to subdivide it into subtropical, temperate, and subarctic, but the question how to limit these subdivisions is difficult to settle. A more rational scheme is that which, in view of the great differences in the climatic relations of land and water, recognizes a first large subdivision of each zone into land and water areas. Then, as continental interiors differ from coasts, and as windward coasts have climates unlike those of leeward coasts, a further natural subdivision would separate these different areas. Finally, the control of altitude over climate is so marked that plateaux and mountains may well be set apart by themselves as separate climatic districts. If each of the zones, whether bounded by latitude circles, or by isotherms, or by wind systems, be con-

sidered under these general subdivisions, as close an approach to actual conditions of climate will be made as is possible in general description.* Obviously, however, when the larger zones are subdivided to such an extent as is here suggested, we are dealing with a classification of climates rather than with climatic zones.

* W. M. Davis, loc. cit.

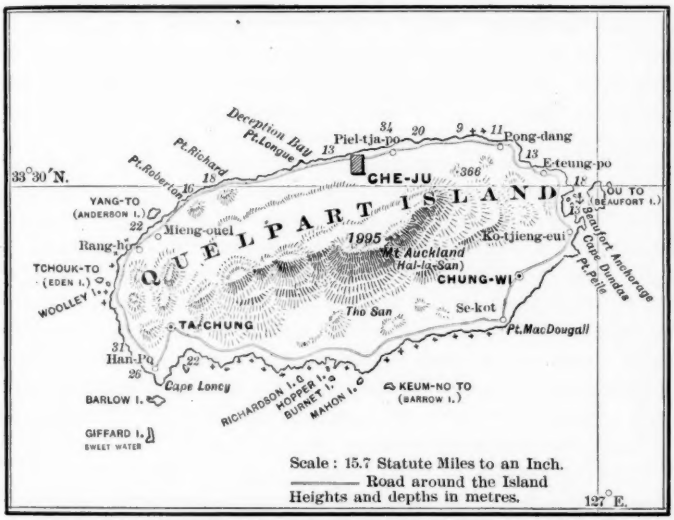
THE ISLAND OF QUELPART.

BY

H. B. HULBERT.

The island of Quelpart lies some fifty miles off the southern coast of the Korean mainland, but only thirty from the outer edge of the line of islands that fringe the coast of the peninsula. It is, in all probability, geologically one with the range of mountains which forms the backbone of Korea, and which finally sinks beneath the waters of the sea off its southern coast. It is by far the largest of the thousands of islands which form the Korean Archipelago, being forty miles long from east to west and twenty-two miles wide from north to south. The whole island is dominated by the central peak, Mt. Auckland, or, as the Koreans call it, Hal-la San, which means, "The Peak which Reaches toward the Milky Way." The entire island is apparently formed by the sloping sides of this mountain, with its many subsidiary spurs. Its origin is manifestly volcanic, for a close examination reveals the fact that there were two distinct streams of lava which flowed from the ancient crater—one toward the north and one toward the southwest. Where the northern stream of lava reached the sea it is twenty miles wide, while the southern one at the sea-shore is thirty miles wide. This prevalence of lava on certain well-defined portions of the island gives rise to two distinct kinds of soil. Where the lava prevails the land is stony and sterile, but where the lava is not found the soil is a rich black mould. Two-fifths of the island are of the former kind and three-fifths of the latter. Toward the east and west the land slopes away to the sea in a long, beautiful sweep, but on the north and south the slopes are steep, and there are many deep gorges.

The central peak of Hal-la San is about 6,550 feet high. At the very summit there is a small lake lying in what must be the crater of the extinct volcano. One of the main spurs of the mountain is called Chang-ol-ak, or "Long Point Peak." On the summit of this, also, there is a small pond. There are many lesser peaks, such as Vine Peak, Many Men Peak, Hog Peak, Deer Peak, Hat Peak, Water Peak, Sunset Farewell Peak, etc. The people say that if any one makes a noise of any kind near the lake at the summit fog and cloud will immediately form and enclose him. A certain well or spring on the mountain-side is called "Bushel Well," and it is said that if any one drinks the water he will be able to leap



NOTE.—The map is drawn from Asie 1:1,000,000, Flle 36 N. 126 E., published by the Service Géographique de l'Armée, Paris, 1898, corr. 1904.

one hundred paces at a step. They believe that this is why the Mongols were so strong when they held the island five centuries ago.

About the island there are a few smaller ones, notably "Cow Island," at the east. This is several miles long. The others are all along the southern coast, and are very small, about a dozen in all. On Cow Island there is a cave at tide-level into which half-a-dozen boats can go together. In the seventh and eighth moons no boats will enter it, because they say that it will anger the dragon which lives there, and it will cause great storms of rain and wind.

This superstition, doubtless, arose because these months are those in which typhoons occasionally sweep over the island.

Quelpart is of some importance as forming a link in the ethnological study which has for its object the determination of the origin of the Korean people. Tradition says that in the dawn of history the island was covered with a tangled forest and was without habitants. From a hole in the ground called Moheung, in Chin-san, on the north side of the main peak, three men emerged. They were Yang-eulla, Ko-eulla, and Pu-eulla, and it was in this order that they emerged. They lived by hunting, they dressed in skins, and they ate raw meat. One day three wooden chests floated in from the east or southeast covered with brown clay. A man mysteriously appeared, clothed in brown, with a red belt. He opened the chests before the wondering eyes of the three inhabitants of the island and disclosed three women clothed in blue (symbol of the East), three calves, three colts, three dogs, three pigs, a quantity of seeds, and some stone dishes. The mysterious man said, "I am an envoy from Japan. Our king had three daughters, and as you have no wives he has sent them to you at my hand. Take them and make a great kingdom here." Then he mounted a cloud and rode away. Each of the men took his wife and other chattels and settled down. Each of them built a town, enclosing as much land as one could shoot across with a bow. It would seem that as time went on the Ko family obtained the ascendency, for tradition says that after fourteen generations had passed three brothers named Ko-hu, Ko-ch'ŭng, and a third, whose name is not given, crossed by boat to the mainland and visited the capital of the kingdom of Kye-rim (which name was changed to Sil-la later).

The astrologers of Kye-rim told the King that the "Guest Star" had appeared in the southern heavens, and that visitors might be expected from that direction soon. True to their word, the three Ko brothers landed at a port called T'am-jin (now Kang-jin) and came up to the capital. They were hospitably received, and the King conferred upon them the titles Sŭng-ju, or "Lord of the Star," Wang-ja, or "King's Son," and "To-nă, or "The One who is in Town." For many centuries these continued to be the names of high official grades on the island of Quelpart. The King also named their island T'am-na. Some say it was so named because the three brothers landed at T'am-jin. Another rendering of the name was T'a-na. In these words the syllable *na* was the ancient word meaning "kingdom." The date of these events is not given; but it must have been very early, for we read that in the middle of

the fifth century of our era the kingdom of T'am-na ceased paying tribute to Păk-che, which was a powerful kingdom in southwestern Korea, and contemporaneous with Kye-rim or Sil-la. The King of Păk-che sent an army to enforce the tribute, but the King of T'am-na, hearing that this was determined upon, sent in haste and renewed his allegiance. When Păk-che fell before the combined arms of Sil-la and China, and Sil-la obtained control of practically the whole of the peninsula, the King of T'am-na, named Chwa-pyŭng To-dong Eum-yul, came and did obeisance to the King of Sil-la. Sil-la was overthrown, and the peninsula passed into the the hands of the Koryu dynasty in 918 A.D., and the Crown Prince of T'am-na, named Mallo, came to the capital and swore fealty to the new king. The latter conferred upon him the title of Sŭng-ju Wang-ja. About the year 1150 the island of Quelpart was reduced to the status of a mere prefecture of Koryu. The records say that the people of the island were very unruly. The Mongols invaded Koryu in 1231, and immediately became masters of the situation. For more than a century Korea was at their mercy. But small mercy they showed. They established on the island of Quelpart a horse-breeding station, in order to recruit their cavalry, and even after the Mongol power had waned and fallen in China, the half-savage Mongol horsemen on Quelpart continued to defy the armies of Koryu. This was because Koryu had sunk to a state of utter weakness through the baseness and effeminacy of her rulers, and any one with a little courage and force could work his will wherever he wished. At last, however, they were successfully attacked; but they appealed to the Mongol Emperor, and he sent to Koryu suggesting that when he was obliged to leave Peking he would make his asylum on Quelpart. This frightened the King, and he hastened to say that the expedition to Quelpart was not against the Mongols but to catch some Japanese freebooters. In 1368 the Mongol dynasty fell, and the Mings came to the throne of China. The Mongol horsemen, however, held their own as yet on Quelpart. Five years later the Ming Emperor sent to the King of Koryu demanding 2,000 of the celebrated horses that were bred on Quelpart. In fear and trembling the King sent to the island for them; but the Mongols said, "We are Mongols. Why should we give horses for our enemies?" They sent 300 of the animals, however. This by no means satisfied the Emperor, and he demanded the full 2,000. The King had to proceed to extremities, and an expedition of 25,000 men, in 300 boats, was sent to the island. Part of the fleet was wrecked by a storm, but the rest landed and attacked the

Mongols, who were 3,000 strong. The latter were driven back, and at last beaten, and had to surrender. Their leader, T'ap-chi, was cut in two at the waist, and many others committed suicide. A large number who refused to submit were cut down. This ended the rule of the Mongols on the island for all time.

That Quelpart has been dominated by volcanic influences has, as we have shown, been fully demonstrated. But we do not have to depend simply on a geological examination to prove this, though, of course, there could be no better proof. The following account, taken from the great Korean geographical gazetteer called the Yŏ-ji Seung-nam, is evidence of volcanic action even within the last few centuries. In the fifth year of King Mok-chong of Koryu (1003 A.D.) a mountain suddenly rose from the water. There were four holes, and from them poured "floods of red water," which soon turned to stone. Five years later another wonder of the same kind occurred, and the king sent a celebrated scholar to examine it. The people reported to him that when the mountain came up there was a dense cloud and fog, accompanied with earthquakes and thunderings. After four days it was all over; but there stood the new mountain, over a hundred feet high and twelve miles around. There was no wood nor grass on it. It was constantly covered with a pall of smoke, but when the wind blew the smoke away from a portion of the mountain it was seen to be of a dirty yellow colour. No one can fail to recognize in this a distinct volcanic action.

The natives say that snow lies on the summits of the mountain until into June; but the climate of the general level of the island is so warm that certain vegetables grow all winter long on the southern side. In February the grass is sometimes four inches high and flowers are in bloom. One observer says:

> All the mountains as well as the slopes on the east are covered with a thick growth of oak, in which deer, wild hogs, hares, and other animals abound. There are no tigers nor bears. The hills that have no trees are covered with the peculiar Korean turf which makes such an exquisite lawn. This is even prettier on Quelpart than on the mainland, and one frequently comes across natural lawns, four or five hundred yards square, covered with this velvety turf, without a single weed visible. There are no good harbours on the coast of Quelpart, and this lack of shelter, together with the prevalence of high winds, makes navigation very difficult.

Very few foreigners have ever visited the island, and of these few hardly any made a careful examination of it; but in the spring of 1900 the Korea agent of the British and Foreign Bible Society, in company with another foreigner, made a complete tour of the island, and made a very careful examination. Their account is particularly instructive; and as it appeared only in a small local periodical, we shall quote extensively from it as embodying the fullest information obtainable at the present time.

These careful observers say that there is a surprising absence of springs and streams, for in making their trip around the coast they crossed only two streams; and this, too, just after heavy rains. There are good springs in the one town of Che-ju, and it is more than likely that their being there is what determined the situation of the island capital. In the other towns there are none, and the people have to use rain-water, which they store in artificial ponds. Where the water from the melting snow goes is a mystery.

The island is divided into three prefectures—a northern, southwestern, and southeastern. Che-ju is the northern one, with the town of the same name as its administrative centre. This is also the seat of the Moksa (shepherd) or Governor of the whole island. It is a walled town, and contains about 1,200 houses. This would mean a population, perhaps, of about 6,000; but this is a minimum estimate, for it is more than likely that each house has more than five inmates. The southwest prefecture is Tă-chŭng, with a town of about 2,000 people in its centre. This town is also walled. In the southeast is the prefecture and town of Chung-wi. The town has 300 houses, with at least 1,500 people. It is stated that there are upwards of one hundred villages on the entire island, and that the population mounts up to the respectable figure of 100,000. This is the native estimate, and cannot be relied upon for accuracy. The three walled towns mentioned lie in the shape of an isosceles triangle, with Che-ju for the apex and the line from Tă-chŭng to Chung-wi for its base. It is about twenty-four miles from Che-ju to either of the other two, and they in turn lie thirty-nine miles apart. Ever since the beginning of the present dynasty the island has formed, from an administrative standpoint, a part of the southwestern province of Chul-la on the mainland of the peninsula, except for a short period just after the Japan–China war, when it was denominated a separate province.

The travellers above mentioned state that the villages lie either along the coast, where the gathering of sea-products forms such a large part of the industry of the people, or near the foot of the mountains, where fuel is plentiful and the people live by agriculture and the rearing of stock. The space between the shore and the foothills is largely unpopulated, and wide stretches of rich soil lie permanently fallow. This may seem a very curious condition of things; but we believe it is not hard to explain. The difficulty of obtaining water makes it more convenient to live near the foot of the mountains, for there the melting snows provide this necessity;

and, besides this, we find that the people who raise cattle keep them on the plains in winter, but drive them into the mountains in summer, so that they may not destroy the fields of grain. It is most natural, then, that they should place their houses between the fields and the summer grazing lands of the cattle, both for their own convenience and the safety of their crops. Those that live on the shore are compelled to do so because they follow the sea so largely. On the other hand, this peculiar adjustment of the population may represent some very ancient social demarcation, or even difference of race, which still awaits investigation. The early traditions of the mainland say that in most ancient times there were two kinds of people—those living along the coast and those living among the mountains. The wide stretch of land lying between these two, in Quelpart, is considered common property, and any one who wishes can cultivate it at pleasure, except in the immediate vicinity of the villages.

Millet is the most important cereal raised, and it forms the staple article of diet. Rice is a luxury that only officials and the wealthy few can afford, and it is mostly brought by boat from the mainland. Moderate quantities of upland rice, sorghum, beans, barley, wheat, potatoes, tobacco, buckwheat, yams, turnips, and cabbage are raised. Some ten varieties of medicinal plants are exported, and a little fruit is grown, mostly oranges, pomeloes, and peaches. The people do not eat much meat, but beef, horse-flesh, pork, dog-meat, fish, and pearl oysters are consumed in moderate amount. We are told that crabs, common oysters and the various kinds of clams that are so plentiful along the shore of the mainland are not found near Quelpart. The sea-bottom in the vicinity of Quelpart is too rocky to admit of fishing with nets, and it is all done with hook and line. Much of the fishing is done from a curious sort of raft made by binding together ten short logs of wood and erecting a platform upon them. This is propelled by a scull. The most curious thing about this craft is its name. It is called the "bamboo boat," though the bamboo does not enter into its construction in any way. In this connection it is worthy of note that some of the aboriginal tribes of Formosa use a raft of the very same kind which *is* made of bamboo. The question is whether this name in Quelpart is not the survival of a name brought from the south and continued even after the word had lost its real significance. This is one of many little indications which point to the southern origin of these people.

Pearl oysters and various kinds of sea-weed are exported to the

mainland in considerable quantities, or were until the Japanese encroached upon the fishing grounds and swept the coast clean of pearl oysters, after which the sea-weed alone was exported. These pearl oysters are very large, and are not bivalves, but cling to the rock with a single shell. It is from these that the Koreans get the mother-o'-pearl with which to inlay their cabinets. The meat of this shell-fish is considered a great delicacy. Only the muscular part is used. This is cleaned and dried, in which process it turns to a rich dull red colour. It is sold in Seoul strung on sticks, each stick holding ten.

Of sea-weeds there are several different varieties. Some of them are used as fertilizers, others as food, and others still are sold to the Japanese for the manufacture of carbonate of soda. The coarser kinds that grow on the surface near the shore are the ones used as fertilizers, but the delicate edible ones grow further out at the bottom. It is a most curious fact that all the diving for pearl oysters or sea-weed is done by the women. From the earliest times the women have monopolized this work, which until within the last ten years they always did in a nude state. There was a strict law that during the hours of fishing no man should go within sight of the fishing-grounds. But when the Japanese began to encroach upon these preserves they paid no attention to this law, and consequently the women were driven out of the business. The people of Quelpart appealed to the central government to stop the utterly lawless encroachments of the Japanese, but without the least success. As it was a matter of life and death with thousands of the people of Quelpart, the women gradually learned to make use of a sort of bathing costume, and so resumed their occupation. Armed with a sort of sickle, and carrying a bag, to which an empty gourd is attached as a float, they swim out a quarter or half a mile from shore, leave the bag floating on the surface and dive ten, twenty, or even thirty feet to the bottom. They cut the sea-weed with the sickle or tear off the pearl oyster, and then rise to the surface and deposit their booty in the floating bag. It takes from twenty to forty minutes to fill the bag, but they do not return to shore until it is done. As may easily be imagined, these women are of splendid physique, and their courage and endurance are marvelous, for the season begins as early as February. Of late years the Japanese have come with diving apparatus and stolen most of the pearl oysters.

This brings up the whole question of woman's status in Quelpart. They do by far the major part of the work, even to bullock-driving. Nowhere else in all Korea are women allowed to carry water, but here they do it all, and often-times it has to be brought a great distance. They use for this purpose a basket swung from the shoulders, and in this basket they carry earthen pitchers to hold the water. This startling variation from the universal custom indicates some ancient difference in habit, and at least proves that Quelpart has not kept up with the mainland in the slow growth of civilization.

Not only do the women do the most of the work, but they exceed the men in number. On the streets one sees three women to one man. As a rule these women are much more robust and handsome than those on the mainland. They compare much more favorably with the men in every way.

Here we find another striking coincidence, for those who are conversant with the aboriginal tribes of Formosa say that the same is true of them. The women are much superior to the men in physique and in general appearance. A member of the Imperial Chinese Customs Service once related to the writer how he made a journey into the very fastnesses of the Formosan mountains and visited the homes of the dreaded head-hunters. He was blindfolded and led all the way by a bodyguard of women. He declared that the younger women of that tribe were among the handsomest women in the world.

The reason why he was led by women was because in this way he could pass through other hostile tribes unmolested, since no one

would attack women. All peaceful expeditions of the kind were so led.

But in spite of the energy of the Quelpart dames the people are very poor. Their food, their houses, their clothes, are all far inferior to those of the dwellers upon the mainland. Dog-skins are extensively used in making clothing. Caps, overcoats, leggings, and socks are frequently made of this skin, with the hair on the outside. Such garments are handed down from father to son, and time adds to their flavour. Ordinarily the people use imported cotton cloth, which is made more durable by dipping into the juice of the wild persimmon. This imparts a dirty brown colour, which obviates the necessity of frequent washings. Many of the men wear broad-brimmed hats of coarse felt like those of the chair-coolies of Seoul, but much larger. They measure about two feet from brim to brim.

The Quelpartian is differentiated from other Koreans in various ways. The ordinary Korean has adopted a form of *kang* from the Chinese. It consists of making flues beneath the floor for heating the room. This has never been adopted by the people of Quelpart. They dig a hole in the ground and build a fire in it, and about this fire they eat and sleep and live. It should be added that in the large towns the official and wealthy classes have followed largely the customs of the mainland in most respects. But we are dealing with the common people, and not with exceptional cases. For the most part, the houses are thatched; and on account of the high winds that prevail, these thatches are held down with a mesh of thick straw-rope net.

The trade of the island is inconsiderable. A few shops in the main towns supply what cotton-shirting is necessary, but the markets that are held in all large towns on the mainland every five days are not known here. A little trade in foreign needles, thread, and nails is done.

The exports from the island consist of seaweed, medicinal plants, cosmetic oil, horse and cowhides, horses and cattle. The oil is pressed from the seeds of the *Datura Stramonium*, which is an evergreen growing luxuriantly all over the southern portion of the island. It blooms in February and puts forth beautiful crimson flowers. It is rare on the mainland.

It is a singular thingthat an island like this should have been the breeding-place for the hardy Korean pony. Outside of Korea, such horses are found nowhere in Eastern Asia, excepting in the Malay Peninsula. They have nothing in common with the Manchu or Mongol pony. The theory of a southern origin would help to explain how an outlying island like this could become the breeding-place of these animals. In winter the animals, both horses and

cattle, wander over the island at will; but in summer they are driven into the hills, to save the fields from being ruined. The many stone walls about the fields on the upper levels are made partly to get rid of the stones and partly to keep out the live stock. No small part of these beasts belong to the Government, and an official is especially appointed to look after them; but we imagine that in these degenerate days the custom is honoured more in the breach than in the observance. The laxness of the Government is reflected in the people, who are not at all scrupulous as to the *meum* and *teum* in horse-flesh.

The religious ideas of the Quelpartians are very crude. At each of the three prefectural towns there is, of course, the regulation Confucian shrine, and near the gates are placed numbers of idols cut out of lava, but, as a rule, the people believe in all sorts of spirits and goblins, and fetich-worship satisfies best their religious feelings. Buddhism once prevailed here, as elsewhere in Korea, but a century or so ago a zealous Confucian Governor drove out all the Buddhist monks and destroyed the monasteries. To-day the Roman Catholics have a considerable following on the island, and two years ago a serious affray occurred between them and the unbelievers. The real cause of this has never been satisfactorily explained, but it is certain that the fault was not all on either side. They assume mourning for only 100 days after the death of a parent, though the usual custom of Korea is to keep it on for three years. In the first and second moons they assemble at the spirit shrines and erect twelve poles, on which they hang masks like horses' faces and dress them in silk. This has something to do, evidently, with the horse-breeding proclivities of the people. There are said to be many snakes and centipedes on Quelpart. If a person meets a gray snake he will not harm it, for he considers it to be superhuman. On the fifteenth of the eighth moon they have a great festival, at which they have a monster tug-of-war, the men pulling at one end and the women and children at the other.

There are few sights worth seeing on Quelpart. On the west side there is a cliff called Chă-am or "Treasure Cliff." It is shaped like a house with a rounded roof, and beneath it there is a cave. The "treasure" consists of a substance called "the milk of the stone-drum"—whatever that means. Near Tă-chung a pinnacle of rock rises to a height of eight hundred feet, and in its southern face, three hundred feet up, there is a cave, the view from which is said to be magnificent. The cave was once used as a Buddhist monastery. On the southern side of the island there are two curi-

ous waterfalls, some ten miles apart. They are almost exactly alike, and are formed by streams falling into circular holes in the rock. These holes are thirty feet wide by forty deep. Near the top of Old Hal-la there stands a row of statuesque rocks that the Koreans call "The Five Hundred Heroes." It has been said that the spot where the three mythical founders of T'am-na arose from the ground is still shown, but the foreign gentlemen already quoted could find nothing about it on the island. But the great geographical work already mentioned says specifically that the place lies two *li* south of the town of Che-ju, and, if it were looked for carefully, there is little doubt that some trace of the story could be found in the vicinity.

Just east of this same town there is a flat strip of land between the sea and the abutting cliffs which is called the Koryŭng Plain. In the days of the Tang dynasty in China (618–905) a Chinese boat was wrecked at this place. It was loaded with precious objects, and it is said that the waves washed up many of these. Centuries after the farmers would occasionally plough up one of them.

The stories told about Quelpart, its mountains and hills, are very numerous and interesting from the standpoint of folk-lore. We can give here only a few as samples of their general style. The spirit of Hal-la Mountain had a younger brother who assumed human shape. When he died the people built a shrine in his honour and called it "Broad Earth Hall." But a man named Ho-jung, of the Song Kingdom in China, came and desecrated it. The spirit took the form of a hawk and perched upon the mast of the bad man's boat and a gale from the north shattered and wrecked it.

Near Chung-wi—so legend says—there once lived an immense serpent, to which an annual offering of a young maiden had to be made or else rain would not fall, horses and cattle would die, and sickness would prevail among the people. A certain gentleman whose daughter's turn had come rebelled against this ophidian imposition, and on the appointed day, instead of sending his daughter, he went himself, armed with a sharp axe. The monster protruded its head from its lair, expecting to find a succulent maiden to eat, but received a new sensation in the shape of a sharp blow, which severed its head. This apparently rid the island of the pest. But the end was not yet. The man cut the serpent into small pieces and enclosed them securely in a large sauerkraut jar. At first the people rejoiced, but soon they found that the serpent came to them every night in their dreams and threatened them with a variety of horrors in case they did not let him out of pickle. They finally did

so, and each piece became a separate and entire snake. But even as his body had been divided, so his power was dissipated, and no more maidens had to be served up for his delectation. To make assurance doubly sure, the people still sacrifice a pig yearly on the spot where he lived and serve it up to his spirit with rice and wine.

Another story relates how the Buddhist monks used to assemble at the foot of Hal-la on a certain day each year and choose one of their number by lot to enjoy the experience of translation. The chosen man would ascend to a certain lofty ledge of rock and immediately a white cloud would roll down the mountain-side, envelop him and then drift away, leaving the rock tenantless. He had manifestly been translated to the habitations of the gods. A certain Governor was sceptical, and proposed to accompany this novel expedition once and see the wonder with his own eyes. Arriving at the foot of the mountain about dark, they camped for the night, sleeping within a ring of fire for fear of the serpents which infested the place. The Governor insisted that they choose the fortunate man before they retired. Then they all lay down and went to sleep—all but the Governor, who sat smoking his long pipe. When they were all wrapped in slumber he went and lay down beside the chosen man, whose approaching felicity by no means interfered with his night's rest, and began puffing tobacco smoke into his clothes until they were covered with little brown spots of nicotine. Morning came and the monks all stood in an ecstasy of expectation, while their more fortunate comrade climbed the steep path. He mounted the ledge, and almost instantly the white cloud shot down from a cleft in the rock far above. It hid him from view for a moment, and then drifted away, showing the ledge bare as the day it was created. A murmur of awe went through the company, and they all fell on their knees in awe and adoration—except the Governor, who bade them wait a moment and keep their eyes fixed on the cleft of the rock from which the cloud had come. A moment later the figure of a man was seen leaping down the mountain's side, and soon their comrade rushed into their midst and fell exhausted. When he revived he told them that the moment he reached the ledge he saw the head of a monster serpent protrude from the cleft of rock and blow a cloud of vapour down upon him. An instant more and the coils of the serpent were around him, and he was swiftly raised to its lair. The serpent dropped him upon the floor of the cave, which was strewn with dead men's bones; but though it seemed desirous of devouring him, it would

throw its head this way and that as if in doubt about something. He slowly backed out of the cave and took to his heels, with the result related. The Governor smiled and pointed to the spots on his garments. There were no more attempts at apotheosis.

EXPEDITION TO HUDSON BAY AND NORTHWARD.

The preliminary report of Dr. A. P. Low, of the Canadian Geological Survey, on the expedition to Hudson Bay and northward in 1903–04, which he commanded, is printed in the annual *Report* of the Department of Marine and Fisheries for 1904. It contains some new facts of interest relating to Hudson Bay, on the western coast of which the party spent the winter.

The *Neptune*, the largest and best of the sealing steamers of the Newfoundland fleet, was chartered for the voyage, fitted out at Halifax, and left that port for the North on August 23, 1903, with officers, crew, and passengers, numbering in all 42 persons. An Eskimo interpreter was picked up at Port Burwell on the Labrador coast, and the vessel crossed Hudson Strait to Cumberland Gulf to visit the settlement of Blacklead, a whaling station on the island of that name near the west side of the Gulf. The Report says:

> The settlement, consisting of some dozen small buildings, is situated on a high, barren rocky island, about five miles from the mainland (of Baffin Land). There is a fairly safe anchorage protected by reefs, in a small bay, at the southeast end. The settlement consists of a small whaling and trading post, belonging to Noble Bros., of Dundee, Scotland: and is the headquarters of the Church Mission Society on Cumberland Gulf.
>
> The whale fishery is carried on at Cumberland Gulf in whale boats manned by Eskimos, who are employed by the whalers for that purpose, at Blacklead and Kikkerton stations. Each boat has a crew of five natives. The fishery starts about the 1st of October, and continues until the Gulf freezes solid—generally in December. It is renewed again as soon as the ice begins to move; which is usually in February, or the beginning of March. The fishery is not very profitable, as whales are not taken every year. Happily for the natives, two whales were captured in the spring of 1903; and later 3,000 seals were killed; this has put new life into the trade, and has prevented the abandonment of the station, which had been seriously contemplated. There are about 450 persons, of Eskimo blood, living about Cumberland Gulf; and all are more or less dependent on the whaling stations for a living; so, were the stations abandoned, there would be great hardships among them; and a number would probably perish if outside help were not afforded.

All the able-bodied males were away hunting caribou on the mainland of Baffin Land. They go in their boats far inland to the neighbourhood of Nettilling Lake, where the deer are very numerous. A visit was also made to Kikkerton, the other whaling station in the Gulf. It is about 10 miles from the north shore of the Gulf, the cluster of small buildings nestled at the foot of a rocky hill on an island. Two rivers on the north side of the Gulf and one at its

head are well stocked with Arctic salmon, and a successful fishery could be developed there.

Returning south, the *Neptune* entered Hudson Strait and followed the north shore. Passing Saddleback Islands, they were found to be double the number marked on the chart. The southeast winds that had prevailed all summer had driven icebergs into the Strait, and over fifty were counted along the north shore.

Nearing Hudson Bay the *Neptune* crossed to the south side of the Strait and near the west end of Charles Island a great many walrus were observed, The walrus were hunted to obtain a supply of dog food, and it proved very exciting sport. Seven were captured, and two polar bears were killed.

The *Neptune* crossed Hudson Bay to the mouth of Chesterfield Inlet, where eight tents of Eskimos were found. Another encampment was found about 120 miles up Chesterfield Inlet, which was ascended in a launch. The men were away hunting, but over 70 deer skins and 400 pounds of meat were purchased from the women. There had been a great slaughter of deer at this camp in August and hundreds of half cleaned skeletons were lying about. At this point the launch turned back to Hudson Bay. The *Neptune* in the voyage to Chesterfield Inlet grounded twice out of sight of land to the north of the Inlet, and several times got into very shallow water. This shows the danger of this uncharted coast.

The party wintered at Cape Fullerton on the west side of Hudson Bay, northeast of Chesterfield Inlet. The harbour froze over on October 16. The short days of winter months passed quickly. Sufficient work was found to keep all busy during the daylight, and the monotony of the long evenings was relieved by games, readings, a weekly lecture on Wednesday, and a dance on Thursday. Another weekly dance was given on board the American whaler *Era*, which was wintering in the neighbourhood.

Early in April Mr. Caldwell explored the country between Cape Fullerton and Wager Inlet to the northeast, and made an excellent sketch of the shore-line. He was absent nearly two months. On June 15, Dr. Low and Dr. Borden, with two of the crew and two natives, left the ship with two whaleboats for a trip to Southampton Island, in the north, the largest island of Hudson Bay. It is observed that Dr. Low does not call it North Southampton Island, as has heretofore been done on many charts to distinguish it from South Southampton Island, separated from the larger island by Fisher Strait. As the name "Coats" is now commonly applied to the smaller of these islands, the Canadians no longer use the

prefix "North" with the larger island. About fifty miles of the western coast-line of Southampton Island were surveyed, and formal possession was taken of it by hoisting the Dominion flag.

On July 18, 1904, the *Neptune* broke out of the harbour ice and started for Hudson Strait. East of Coats Island much heavy ice in large sheets was encountered, and the ship was forced far to the southward. When she finally got into Hudson Strait it appeared blocked with ice, and the vessel was beset for nearly two days, drifting to the eastward. She was finally able to force her way into open water. No serious encounter with the pack was met later, and on July 25th the party reached the *Erik* at Port Burwell with supplies from Halifax.

The coal and provisions were taken on board, and on August 2 the *Neptune* started on her northern cruise to Cape Sabine, at Smith Sound. The passage of Melville Bay was made in very dirty weather, with fog and heavy rain, but fortunately little ice until within a few miles of Cape York. The progress to the north was not impeded, however, and on August 10 the vessel entered Etah Bay, looking for the Arctic highlanders, but none were there. The party crossed to Cape Sabine, passing very heavy Arctic ice, which had come down the Smith Sound channels, and took formal possession of Ellesmere Island and adjacent islands for the Dominion in the name of the King.

No time was then lost in getting southward away from the heavy ice that was pouring steadily past Cape Sabine. The flag was again hoisted over North Devon and North Somerset. In Ponds Inlet an encampment of the western Eskimos was found in thirteen tents, and up the Inlet the Dundee whalers *Diana* and *Eclipse* were met. Only five small Dundee whalers were at work last year. They had caught nine whales up to that time, but it was learned later that the fall fishery along the east coast of Baffin Island was entirely unsuccessful. The *Neptune* reached Port Burwell again September 4, and arrived at Halifax on October 11, after an absence of a year and fifty-one days, during which she had steamed over 10,000 miles.

The year's work included 1,175 miles of log and compass surveys of coast-line, previously unsurveyed; 91 miles of chain and micrometer surveys of the harbour and environment of Cape Fullerton; many astronomical observations for the position of Fullerton; 433 soundings through six feet of ice in the harbour and approach to Fullerton; 610 miles of geological investigation on the west coast of Hudson Bay, from the head of Chesterfield Inlet to the head of Wager Inlet; 70 miles of track survey and geological

examination on the west shore of Southampton Island, and 95 miles of boat survey (geological) of the east side of Ungava Bay; total surveys, 2,041 miles.

Large collections of rocks and fossils were made, anthropological studies were carried on, and large collections of flora and fauna were obtained. The average temperatures at the winter camp in Hudson Bay were: December, −8.1°; January, −22.4°; February, −27.8°; and March, −20.6.

THE USEFUL PLANTS OF GUAM.

The Government press has issued (Smithsonian Institution) a volume of 416 pages on this subject. It forms Volume IX of "Contributions from the United States National Herbarium," and is a notable accession to our knowledge of this little island, the result of fortunate circumstances making it possible to secure a careful botanical study of it. The author is Mr. W. E. Safford, assistant botanist in the Department of Agriculture. For several years, when a lieutenant in the U. S. Navy, he had an opportunity to study the plants of Upolu and Tutuila, of the Samoan group, and of Oahu, of the Hawaiian group. He was Assistant Governor of Guam in the year ending August, 1900, and the book is an elaboration of notes and observations made in that year, and during the earlier years of his studies among the Pacific islands.

While the title is "The Useful Plants of Guam," it includes references to every plant known to occur there, with particular attention to those which have been described as species new to science. The descriptive catalogue of plants covers 234 pages. The principal plants used for food—fibre, oil, starch, sugar, and forage in the tropical islands acquired by this country—are discussed and their common names are given, not only for Guam, but also for the Philippine Islands, Samoa, Hawaii, and Porto Rico. The methods of cultivating them are given in detail, and the preparation of their derivative products, such as arrow root, coprá, and cacao.

Mr. Safford also studied the archives of Guam, and his account of the discovery, early history, and explorations of the island, with its climate, ethnology, and economic conditions, affords the most comprehensive and authentic picture of Guam thus far published. There are 70 illustrations, including a map of Guam, and half-tone

pictures of many plants, forests, typical native dwellings, Government buildings, and settlements.

The author has much to say of the dispersal of plants by ocean currents. The east coast of Guam is the windward side, and along its sandy beaches is a line of drift, just above high-water mark, rich in seeds, fruit, and drift-wood, brought by the great ocean current which sweeps across the Pacific from east to west. Many of these seeds and logs are covered with teredo borings or with barnacles, but often they are fresh and little worn by the erosion of waves and sand. Many seeds are dead, but some are alive and capable of germination.

Not all the species have gained a foothold on the island. The seeds of plants, for example, which grow in muddy estuaries or mangrove swamps, cannot establish themselves on a clear sandy beach. Nuts of the nipa palm are washed ashore in perfect condition, but can grow only near the mouths of streams where the water is brackish. Germinating fruits of *Rhizophora* and *Bruguiera* come ashore only to die. Many cocoanuts come in the drift, but on the east coast, where they are washed ashore, there is not a single cocoa grove, while on the west or leeward side, where the groves are planted, they thrive near the sea. It seems probable that cocoanuts grow in Guam only where they have been planted, except in cases where nuts that have fallen from local trees have taken root.

Many seeds are sufficiently buoyant to float on the surface of the drift. Sea-beans, for example, inclose an air-space between their cotyledons ; others have kernels which do not fill their shells, but leave a space for air to keep them afloat; others have fibrous husks composed of light tissue; others have woody or coat-like shells of low specific gravity, and still others have a separate air-chamber. Mr. Safford mentions a large number of these fruits and seeds that are brought ashore.

With Schimper as a guide and the benefit of the experiments of Guppy and of Treub, a student on the island of Guam would find abundance of material and a most favorable opportunity for studying the seeds of the drift in the places where they have been deposited by the great trans-Pacific current, and where they could be observed in the process of germinating under absolutely natural conditions.

There are no indigenous quadrupeds. The only mammals in early times were two species of bats, the fruit-eating "flying fox" and a small insectivorous species, *Emballonura semicaudata*, Peale. The Norway brown rat was probably introduced by ships. It is very abundant, and a great pest, especially in the maize and cacao plantations. The common mouse, also introduced, causes little harm. An introduced deer, *Cervus mariannus* Desm., overruns the

island and causes great damage to crops. Its flesh has a fine venison flavour, and is a food staple of the natives. Buffalo, cattle, horses, mules, pigs, goats, cats, and dogs have been introduced. The buffalo are used for draught purposes, as in the Philippines. Horses do not multiply. Colts are born, but do not thrive.

The author describes the land-birds, the most beautiful being the rose-crowned fruit-dove, with plumage of green, yellow, and orange, and its head capped with rose purple. There are few reptiles. The natives do not engage so much in fishing as formerly, though they catch in nets and traps small fish swimming in schools near the beach.

The writer tells of the terrible hurricanes that visit the island at any season of the year, destroying native houses and crops, and stripping most of the vegetation of its foliage. The destruction in 1900 by two hurricanes caused a dearth of food, and the Government expended nearly $10,000 for the relief of the natives. Among the most serious results is the stripping of cocoa trees of their leaves. The inflorescence is formed in the axils of the older leaves, and if these are injured the flower-buds shrivel and the tree fails to produce. For this reason, in 1901, the year after the hurricanes, not an ounce of coprá, which is practically the only export of the island, was produced in Guam.

Many of the typhoons which sweep the Philippines apparently have their origin in the neighbourhood of the Marianne Islands, of which Guam is the most southern member. Dr. Abbe suggests, in a recent report, that a station be established on Guam for meteorological observations, to be connected by telegraph with Manila. This should be of great benefit to vessels in Philippine waters, giving warning of approaching high winds and indicating the kind of weather to be expected.

THE YERBA MATE.

This picture of the yerba mate tree is taken from *Globus* (No. 14, 1905), in which the mate and timber industries of the Misiones Territory of Argentina are described. Doubtless many North Americans have never seen a picture of the mate tree (*Ilex Paraguayensis*), the leaves of which, used like tea leaves to make an infusion for a beverage, make one of the important commercial articles of the southern part of South America. Thousands of per-

sons in southeastern Brazil, Paraguay, and the Misiones Territory earn their living by collecting, treating, and marketing this leaf.

The yerba mate is described by Father Vogt, the writer of the article in *Globus*, as an evergreen growing to a height of 20 to 35

YERBA MATE.

feet. It thrives on the banks of rivers and brooks and in the damp and shady parts of the forests in sub-tropical temperatures. It is in bloom in October and November. About the end of

January its fruit matures, each containing four little seeds, like peppercorns, with hulls so thick that the seed, in popular opinion at least, never germinates unless it first passes through the stomachs of small birds that feed on it.

The *Daily Consular Reports* (No. 2247) contain several articles on the yerba mate from our consuls, one of whom declares that the seed may be germinated by soaking it in warm water for four days. The fact remains, however, that the plant has not heen cultivated to any extent. The small oval leaves are collected from the wild plant, which is regarded as so important that the Governments concerned have adopted stringent regulations for its protection. A severe penalty is prescribed for gathering the leaf when the tree is flowering. The harvesters, with ordinary machetes, lop off the outside foliage and twigs, but the top centre of the tree must not be touched. If it were cut off the tree would die. If a man fells a tree to facilitate harvesting he is punished. After the crop is gathered from a tree four years elapse before it is ready for another harvest.

Yerba mate may be prepared for market in thirty-six hours. The leaves are slightly scorched by being passed rapidly through a fire, and then the twigs are suspended in sheds open at the sides, where they are exposed for fifteen or twenty hours to a fire of scented wood, after which the leaves and twigs are ground and the whole is ready for market. Ten men in two days often prepare three or four tons.

The infusion of yerba mate is now more or less used by 18,000,000 people in Brazil, Paraguay, Uruguay, Argentina, Chile, Peru, and Bolivia, the annual consumption never falling below 55,000 tons. All efforts to introduce it into Europe have practically failed. Mr. F. Seeber, in his book "Great Argentina" (1904), writes:

> This beverage is consumed by country people in most of the South American Republics. They attribute certain tonic properties to it and prefer it to coffee. Argentina, which produces yerba mate of inferior quality in the Missions Territory, imports the article from Brazil and Paraguay to the amount of $3,200,000 and $800,000, respectively, making together $4,000,000, while the imports of coffee and tea amount to only $750,000 and $450,000 respectively.
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> According to the *Revue Scientifique de Paris*, Brazil exports 30,000 and Paraguay 5,000 tons per annum. "Its virtues," says M. Conti, "as a mild stimulant are well known, as well as its nutritious qualities." In parts of South America it forms nearly the whole sustenance of field laborers in outdoor pursuits. Women often take 10 or 12 cups daily. All authors from the Jesuits down to Parody say that it can sustain the system during long hours of labor. The consumption has grown fivefold since 1840, although in the city of Buenos Aires it is almost out of fashion. Mr. Parody says that it may well supplant coffee, being also much cheaper, selling at 8 or 10 cents per pound.
>
> Foreign workmen soon become habituated to the use of yerba mate and even ask for it in place of coffee. Argentina is experimenting with the tree in the botanical garden at the capital with the hope of improving the quality of the plant.

GEOGRAPHICAL RECORD

AFRICA.

SURVEYS IN SOUTH AFRICA.—The report of the Astronomer at the Cape of Good Hope for 1903 announces the completion of the field work and computations relative to the survey of the Anglo-German boundary of Southwest Africa, while the reduction of the geodetic survey of Southern Rhodesia is also completed. Operations in connection with the measurement of the arc along the 30th meridian, from the Zambezi to Lake Tanganyika, under the direction of Dr. Rubin, were in progress during the year, but owing to grass fires little could be done beyond reconnaissance, beaconing, and astronomical observation.

As a result of Lord Milner's endeavours for the creation of a topographic survey of British Africa south of the Zambezi, we learn that the Transvaal and Orange River Colonies have provided an organization sufficient to complete the principal triangulation of these colonies in three or four years and to make connection with the systems of principal triangulation in the Cape Colony and Natal. It is also proposed to carry out the triangulation through Basutoland and the portion of Zululand annexed to Natal, the cost to be defrayed by the Governments concerned. Thus, it is shown, the whole of British South Africa, with the exception of Bechuanaland, will be on an equality in the matter of survey should the Government of Rhodesia agree to the connection of Gwelo with the geodetic system south of the Limpopo.—(The *Geog. Jour.*, April, 1905.)

RAILROAD PROGRESS IN AFRICA.—The *Deutsches Kolonialblatt* for March 1 has a map showing the route of the Tanga Railroad, in German East Africa, from the port of Tanga to Mombo, on the western side of the Usambara highlands. The railroad reached this point on February 19, thirty miles northwest of Korogwe, which had been the terminus for a considerable period.

A British Bluebook of December, 1904, says that in Sierra Leone 135 miles of narrow gauge railroad (2 feet 6 inches) are in operation, and 87 miles are in course of construction; 125 miles (3 feet 6 inches gauge) have been completed in Lagos, and 170 in the Gold Coast; or a total of 430 miles in operation in the three colonies. Rapidity of construction is not aimed at, the building being carried on tentatively in sections, to gain experience and prove the value of the enterprises. The difficulties encountered in West Africa have included "the want of landing facilities, sickness of the staff, excessive rainfall, obstruction caused by dense tropical forest, and the necessity of carrying on the entire work and conveying all the materials from one base."

PALEOZOIC GLACIATION IN THE TRANSVAAL.—Near Balmoral, in the Transvaal, there are some undoubted evidences of ancient glaciation in the beds of the Karroo system which underlie the coal treasures. These are fully described by E. T. Mellor in the Report of the Geological Survey of the Transvaal for 1903, and several excellent photographs indicate how unquestionable the evidence is. This evidence consists of both glacial deposits and glacial striæ on the bed-rock. The deposits were laid down upon a varied land surface "which had already undergone considerable disturbance and denudation." They consist of conglomerates, sandstone and shales, collectively known as the Dwyka conglomerate. The beds are

irregularly alternating and more or less lenticular, including many boulders of various kinds embedded in clay or sandy matrix full of smaller angular rock fragments, the whole bearing a close resemblance to glacial till, which is increased by the polished, facetted, and frequently-striated faces of the boulders. The photographs of glacially-striated bed-rock show markings so clear and distinct that they might pass for photographs of striations made by the Quaternary ice-sheet of North America.

This exceedingly clear case of ancient glaciation, to be added to the few already known, is of great interest to glacialists. Mellor is of the opinion that the phenomena demand for their explanation not mere local glaciers, but a genuine ice-sheet of continental character. This conclusion seems warranted by the widespread extent of the glacial deposits in both the Transvaal and Cape Colony, and by the uniformity of direction of the glacial striæ which, in places fully 25 miles apart, are from north-northwest to south-southeast. R. S. T.

The Macmillan Expedition.—Mr. W. Macmillan, of St. Louis, Mo., and his party, after completing early last year the exploration of the southern boundary of Abyssinia, and investigating the connection of the rivers near Lake Rudolf with the Nile system, returned in July to Khartum and Cairo, where another trip into Uganda was arranged, from which the party has recently returned. Leaving Mombasa in the middle of September, the explorers proceeded to the Athi Plains, and thence from Eldoma Ravine across the Gwasongishu Plateau to Mont Elgon. Mr. Macmillan is now organizing a further expedition up the Blue Nile, in order to establish a commercial river route between Abyssinia and the Sudan, and has had built in Norway a flotilla of specially-designed wooden vessels for the navigation of the rapids. It is expected that a start will be made during the present month.—(*Scot. Geog. Mag.*, April, 1905.)

AMERICA.

Petroleum Fields of Alaska and the Coal of Bering River.—The U. S. Geological Survey presents (*Bull.* No. 250) a report of the preliminary examinations of the structural and economic geology of the localities in Alaska where indications of petroleum have been found. The studies for this report were made by Mr. George C. Martin. In transmitting the report to Director Walcott, Mr. Brooks, in charge of the division of Alaskan Mineral Resources, says that though only few wells have been drilled, and it is too soon to predict an important future for Alaska as a petroleum-producer, Mr. Martin's studies show that there is ample justification for further prospecting, and that the region may yet be an important source of illuminating oil.

Mr. Martin's report also gives an account of the Bering River coal deposits, which contain the best coal yet found on the Pacific coast of the continent. Further investigation of these coal and petroleum fields has already begun.

These fields, though widely separated, are all on the southern coast of Alaska, and except the Bering River coal fields, are on tide-water. The petroleum field of Controller Bay is east of the mouth of Copper River; the Cape Yaktag fields are 75 miles farther east. The Cook Inlet fields are about 320 miles west of Controller Bay, and the Cold Bay field is about 160 miles to the southwest on the southern coast of the Alaska Peninsula. The Bering Sea coal fields are from 20 to 40 miles from the coast, in the valley of Bering River, which flows into Controller Bay. All the petroleum regions may be reached directly by steamer from Seattle, except the Cape Yaktag field, where there is no regular steamer landing.

Mr. Martin describes the geological formation of each of these regions. In the

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Controller Bay district petroleum seepages are very abundant. The petroleum is seen oozing from the joints and bedding planes of the carbonaceous shales and volcanic ash-beds. Fifteen wells had been drilled, or were drilling, in this region in September last year. None of them had reached a depth exceeding 1,100 feet, and oil in commercial quantities had not yet been produced.

At Cape Yaktag there are said to be good seepages in several of the creeks, but no development work has been done owing to the difficulty of transporting machinery. In the Cook Inlet region the surface indications of petroleum consist of seepages or oil-springs and the so-called "gas" springs. In the first, the petroleum may be seen oozing from the cracks in the rock, or coming out of the soil. More drilling is necessary to obtain a knowledge of the underground conditions, as well as to estimate the economic and commercial value of the field. In the Cold Bay district the flow of petroleum from seepages at several points near the oil wells is large and constant. One of them supplies lubricating oil for use at the wells, three of which were begun in the summer of 1903. If petroleum should be discovered in commercial quantities in this region, it may be piped to Coal Bay by gravity, and shipped thence to southern ports. A few tests of the petroleum show that it is a refining oil of the same general nature as the Pennsylvania product.

The Bering River coal area, as far as known, is restricted to the region north of Bering Lake and Bering River, embracing an area of about 120 square miles. The seams vary in thickness from a few inches to 31 feet, and it is reported that a thickness of over 60 feet was found in a tunnel on the north side of Stillwater Creek. The coal resembles the harder bituminous coals of the East more than it does anthracite. Under ordinary handling it will probably crush to almost the same extent as the harder semi-bituminous coal, which will not impair its value for steam purposes, but will necessitate careful handling if it is to compete with Pennsylvania or Welsh anthracite as a domestic fuel. The seams exposed along Shepherd Creek not only possess the greatest thickness, but are also the purest coals and have the highest heating power.

A PRIMER OF FORESTRY.—This book of 88 pages, by Mr. Gifford Pinchot, Government Forester, is printed as *Bulletin* No. 34, Part II, in the Bureau of Forestry, Department of Agriculture.

It will be attractive to the general reader as well as valuable to all who desire to make practical application of the principles of forestry. It first describes the service and uses of the forest, which, when held as productive capital, is useful in proportion to the interest it yields:

> Thus, an acre of sprout land may be worth only $5, while the investment in adjoining land stocked with old trees may be $50 an acre. This is the view which controls the management of State forests in Germany.

There are four things a forest requires for the best service: Protection, strong and abundant reproduction, a regular supply of trees ripe for the axe, and space enough for every tree. The annual yield should be as nearly equal as possible. The various methods of handling forests are discussed. Our lumber men disregard the future of the yield altogether, and in consequence the forest loses its capital value. A chapter is therefore given to wasteful methods, in contrast with methods that are conservative and that renew the supply. How to plant trees, the climatic influences affecting forests, etc., are treated in detail, and the book closes with a comparison between forests in foreign countries and at home which is full of useful information for our tree-growers:

> The first professional foresters in the United States were obliged to go abroad for their training;

but in 1898 professional forest schools were established at Cornell University in New York, and at Biltmore in North Carolina, and they were followed by the Yale Forest School in 1900. Others have sprung up since. At present thorough and efficient training in professional forestry may be had in the United States.

Forty-nine illustrations, nearly all half-tone, are a helpful feature of the book, which should be in the hands of every owner of forest lands.

BIBLIOGRAPHY OF PAPERS ON UNDERGROUND WATERS PUBLISHED BY THE U. S. GEOLOGICAL SURVEY.—A bibliography of all the publications of our Geological Survey relating to underground waters, and issued between 1879 and 1904, appears as Water Supply and Irrigation Paper No. 120. There are about 600 titles, the papers averaging about 21 for each year, from 1880 to 1903; while in 1904, owing to the publication of the work of the new division of hydrology, the number was increased to about 130. The bibliography is supplemented by an index which facilitates reference to the various groups of topics and to papers relating to underground waters in various States and in other political and natural divisions.

STREAM MEASUREMENTS IN 1903.—The Geological Survey has published in Water Supply and Irrigation Papers (Nos. 97–98) progress reports of stream measurements in 1903. Part I includes Northern Atlantic, Saint Lawrence and Great Lakes drainages, and Part II Southern Atlantic, eastern Gulf of Mexico, and eastern Mississippi River drainage. Part III, yet to appear, will embrace the western Mississippi River and western Gulf of Mexico drainage, and Part IV the Interior Basin, Pacific, and Hudson Bay drainage. The requests for information from the general and engineering public concerning stream data are constantly increasing. These papers contain data collected at the regular gauging stations, the results of computations based upon them, and other information useful in hydrographic studies. Each volume has a map of the United States showing the principal river stations maintained during the year.

CURRENTS OFF SOUTHERN NOVA SCOTIA.—The Department of Marine and Fisheries of Canada has published a report by Dr. W. Bell Dawson on "The Currents at the Entrance of the Bay of Fundy and on the Steamship Routes in its Approaches off Southern Nova Scotia." The data are taken from the investigations of the Tidal and Current Survey in 1904. The currents were taken 3½ to 15 miles off shore on the routes usually followed by steamships. They are predominantly tidal, running strongly during flood and ebb in the two directions, which are usually opposite. The characteristic of the current which deserves special attention is the change found at points only a few miles apart. In passing islands the strength may vary greatly, according to the offing. In channels and passages there may be a difference of an hour between the centre and the sides in the time of slack-water. Almost everywhere the current is as strong down to a depth of 30 fathoms as it is on the surface. There is no general movement of the water in any one direction which is at all well marked.

TWO NEW PROVINCES IN CANADA.—A bill was introduced before the Canadian Legislature on February 21 for the creation of two new Provinces or States embracing the region occupied by those territorial divisions of the North West Territories known as Athabasca, Alberta, Saskatchewan, and Assiniboia. The western Province is to be called Alberta, and the eastern Saskatchewan, and they will extend from Manitoba to the Rocky Mountains, and from the United States to the 60th parallel. The two Provinces will divide this vast area nearly equally, each with an area of about 225,000 square miles. The bill provides that each Province shall have a Legis-

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lative Assembly of 25 members, and that the Capital of the Saskatchewan shall be Regina, heretofore the Capital of the North West Territories. The Capital of Alberta will be temporarily at Edmonton, until the Legislature of that Province decides upon its permanent situation. The date proposed for the creation of the new Provinces is July 1 of this year. It is also reported that the Provinces of Quebec, Ontario, and Manitoba may all be extended northward to the shores of Hudson Bay.

ARCTIC.

A SCIENTIFIC STATION AT DISCO.—The latest development in the scientific study of Greenland is to be the establishment of a station on Disco Island under charge of Mr. Porsild, assistant in the Botanical Garden at Copenhagen. The Danish Government has voted a small sum to erect and equip the station, which will probably be located at Godhavn. Mr. Porsild has also the support of several of the Danish learned societies. The purpose of the station will be largely to study all the biological conditions of Greenland. Much attention will also be given to other questions of polar geography, so that the station may become a centre of scientific polar exploration. It is hoped that its work will, to some extent, ameliorate the conditions of life of the 10,000 Eskimos who inhabit the southwest coast of Greenland. Mr. Porsild, for example, hopes to be able to show that the cultivation of certain grasses will enable the Greenlanders to add cattle to their resources, and also stimulate them to raise some of the hardier varieties of vegetables. He will endeavour also to quicken their interest in fishing, as there seems to be no reason why an important industry of this nature should not be developed along their coast.

AUSTRALIA.

DRAINING COASTAL SWAMPS IN NEW SOUTH WALES.—The State of New South Wales has begun to drain its swamps along the coast to increase the agricultural area. Some of the richest lands in the State (*Jour. and Proc. of the Royal Society of New South Wales*, 1904) are the coastal swamps in the humid region, which, in their virgin state, are useless for any purpose, but, when drained, are capable of supporting a dense population. Most of these swamps are close to the coastal rivers, easy of access, and only require drainage works, and in some cases works for water supply; for it is found that, when the larger swamps are drained, artificial means of providing water for stock are usually necessary. Drainage works have been completed on the Duranba swamp on the Tweed River, and are in progress on the Coopernook swamp on the Manning River. Plans are being prepared for dealing with other coastal swamps. It is expected that the Macleay Swamp, having an area of 60,000 acres, will be drained.

EUROPE.

A NEW CAVE IN AUSTRIA.—The Trieste Touring Club has discovered a cave of large extent at Markovsina, near that city. It has many very large chambers filled with stalactites of unusual beauty, and it far surpasses in extent and natural decoration all the other caves of the Karst region discovered up to the present time. The interior of the cavern is reached through two perpendicular chasms, one 115 and the other 72 feet deep. At the bottom of the grotto is a great water-course running the entire length of the main cavern. Many side passages leading to parallel caverns have been discovered, all of them containing groups of highly-coloured sinter formations. A number of blind troglodyte animals were found. There is another

passage into the cavern, which at present is impassable on account of the fallen rocks; but below it is a fine deposit of the fossil remains of animals dating from the Ice Age.

Barley and Rye Growing 6,900 Feet Above Sea-Level.—This picture shows some fields of barley and rye above the hamlet of Findelen, in the Alps. Findelen is on the sunny southern slope of a little valley, which ends in the neighbourhood of Zermatt. At an altitude of about 6,800 feet, it is the highest permanent settlement in Switzerland excepting Juf, which stands about 190 feet higher. As the slope fully faces the south it is warmed by the direct rays of the summer sun, enabling cultivation to be carried on at a much higher altitude than on neighbouring slopes with northern exposure.

Thus one may stand in midsummer beside these fields of yellow grain and see not far away the marvellous ice-fields and snows of the Findelen and Strahlhorn glaciers; and on the northern slopes, which have no sunshine for much of the day, there is an Arctic-Alpine flora and patches of snow below the level of the grain fields on the southern slope. A few hundred yards separate from one another two kinds of vegetation that at lower levels of the earth surface are 25° of latitude apart. This curious example of the importance of a southerly exposure in Swiss agriculture is taken, with the picture, from *La Géographie*, No. 3, 1905.

The Effect of Geological Formations upon the Distribution of Population in Sweden.—According to *Ymer* (Häft 3, 1904), Mr. Per Stolpe has been studying the geological deposits in relation to the density of population in Sweden, and finds that there is a remarkable connection between them, though other factors have doubtless contributed to the present distribution. The influence of the limits of marine deposits, the occurrence of calcareous soil, and the surface topography are plainly marked in the distribution of the people. The calcareous soils derived from

the Silurian formation are especially productive, and thus encourage intensive agriculture. It is also notable that vegetation is more luxuriant on the soils formed from the latest eruptive rocks, basalt and rhyolite, than in the neighbouring districts. Among the other factors influencing the distribution are, of course, the climate and the concentration of population in the lumber and iron districts.

OCEANIA.

FLORA OF THE ISLANDS SOUTH OF NEW ZEALAND.—The flora of the small islands to the south of New Zealand (Auckland, Campbell, Antipodes, Bounty, etc.) presents interesting problems in connection with the distribution of plants over the southern part of the southern hemisphere. These islands have many floral affinities with New Zealand, but they also contain an element to which the name "Fuegian" has been given by botanists. Our knowledge of their flora has lately been extended by Dr. L. Cockayne, who, in 1893, visited most of the groups in winter. All previous botanical observations had been made in spring or summer. He communicates his results to the *Transactions and Proceedings of the New Zealand Institute* (Wellington, 1904), to the following effect:

The general character of the climate of all the islands is marked by cloudy skies, frequent showers, mild winters and cool summers, with furious gales accompanied by hail or sleet, the effect of which upon the trees is marked. In the "Rata-forest" of Auckland group the low summer temperature and the furious winds have led the trees to form a dense flat roof of foliage with a luxuriant lateral growth of the branches, and beneath this canopy the hygrophytic factors exercise full sway, as shown by the abundance of filmy ferns, liverworts, etc. Another type of forest is that of the *Olearia Lyallii*, which occurs locally only, but grows with great luxuriance, so that there seems no reason why it should not be the dominant forest of the southern islands. Sheep farming is carried on in Campbell Island. Of the flowering plants, 39 per cent. are endemic, 18.8 per cent. Fuegian (including five per cent. which do not extend to New Zealand), and 42 per cent. New Zealand, excluding those also Fuegian. Of the plants which extend to New Zealand nearly half are mountain plants, the remainder including plants of the sub-Alpine and Alpine regions. Dr. Cockayne believes that the presence of the Fuegian element is due to former land connections rather than to the agency of birds, winds, currents, etc.—(Condensed from *Geog. Jour.*, April, 1905.)

A TORNADO IN THE VAVAU ISLANDS.—*Les Missions Catholiques* (March 24, 1905) publishes a number of half-tone pictures showing the devastation wrought by a tornado in the Vavau group, east of the Fiji islands, on Dec. 29 last. The pictures show houses overturned, trees uprooted, cocoanut trees stripped of their leaves, plantations destroyed, and crops ruined. The devastation was almost complete, and if it were not that the natives can soon replace their dwellings and raise new crops the suffering would be greatly intensified. The article describing the pictures says that the wind blew with extraordinary violence for two hours, the storm being accompanied by a deluge of rain. All the missionary houses, including the church, were destroyed or badly damaged. The sailing vessel in which the missionaries visited their stations on forty islands was dashed to pieces. As soon as the hurricane had passed there was complete calm, and the bright moonlight revealed the terrible work of destruction.

GENERAL.

KOLONIAL HANDELS-ADRESSBUCH, 1905.—The Kolonial Wirtschaftliches Komitee of Berlin has issued the ninth edition of this annual reference book, con

taining the usual amount of diversified information concerning the German colonies. There are coloured maps of all the colonies, complete lists of the planters, merchants, and labourers, statistics of the Societies in Germany interested in colonial development, and information relating to the government of each colony, the military forces employed, the missionary work, Government schools, trading companies, communications by steamships and sailing vessels, railroad development, Customs duties, and trade statistics. No more complete compilation of the kind is published by any other colonial nation, and this annual is essential to all who wish to keep informed as to the latest phases of progress in the German colonies.

HANGING VALLEYS.—Normally a tributary stream enters its main valley with a grade adjusted to the level of that valley. This is a normal result of the formation of valleys by stream erosion. There are, however, numerous instances of tributary valleys which depart widely from this condition, and have their mouths hanging high —in some cases a thousand or fifteen hundred feet above the bottom of the main valley. Such a condition is common in glaciated countries, and especially in regions where valley glaciers have passed down the main valleys, as in the Alps, the Sierra Nevadas, Alaska, and Norway. To account for this abnormal discordance of main and tributary valleys ice-erosion has been appealed to by a number of geographers in Europe and America; but others have opposed the ice-erosion theory, primarily on two grounds: (1) the supposed inefficiency of ice as an agent of erosion; (2) the vast amount of erosion which the theory of ice-erosion demands, and the absence of proof of such erosion in the form of correlative deposits. As a result of this difference in interpretation, there has in recent years arisen a literature of considerable extent devoted to the two sides of the subject.

One of the most recent contributions to the discussion is by Prof. H. L. Fairchild (*Bull. Amer. Geol. Soc.*, Vol. 16, 1905, pp. 13–74), under the title: "Ice-Erosion Theory a Fallacy." While there is much of value in this paper, there is also much that is inconclusive. The conclusion regarding hanging valleys—one of the main arguments for marked glacial erosion—does not leave the subject of their origin in a very satisfactory state, for, while vigorously asserting that "the ice-erosion argument for hanging valleys is illogical," Mr. Fairchild has nothing better to substitute than the following: "these features will, undoubtedly, be explained as normal product of atmospheric and stream work under conditions not yet understood."

The article next succeeding this one in the same publication (pp. 75–90), by Prof. I. C. Russell, is devoted specifically to hanging valleys. Russell shows that hanging valleys may result from four different causes: (1) by the deepening of a main stream more rapidly than a tributary under certain favourable conditions; (2) by the cutting back of a river mouth by waves along a shore-line; (3) by crustal movements; (4) by glacial action. He admits that the great abundance of hanging valleys in glaciated regions calls for an explanation, which involves former glaciation; but, instead of explaining them as the result of great deepening of the main valley, he states six sets of conditions under which the hanging valleys may be developed without great differential ice-erosion. In his paper Russell considers certain specific instances, and also generalizes on the subject as a whole. His paper is of decided importance, because it calls attention to the complexity of the subject and the possibility of alternate explanations. It contributes facts and sane discussion on a subject which needs such contributions.

R. S. T.

ACCORDANCE OF SUMMIT LEVELS AMONG ALPINE MOUNTAINS.—That there is a general accordance in elevation among peaks in many, if not all, mountain ranges is generally admitted. That this accordance is due to a former reduction of the

mountains to the condition of a low-lying peneplain and subsequent uplift and dissection is almost universally held by American physiographers. So far has the theory of peneplains been extended that a good share of the earth's surface, including mountains, plateaux, and plains, has been interpreted as regions of ancient peneplaination. Mountain ranges 12,000 to 13,000 feet high are believed to furnish evidence of such reduction. A few workers have failed to be convinced by that evidence, which has led some of our keenest physiographers to apply the explanation of peneplaination to so much of the earth's surface; but the literature of peneplains has steadily increased, and one has come to expect descriptions of new peneplains whenever a new region is studied.

Papers opposing the theory are much more rare, and consequently more noteworthy; and among these papers a recent one by Dr. R. A. Daly (*Journ. Geol.*, Vol. XIII, 1905, pp. 105–125) is especially noteworthy, because written by a man who has hitherto been an advocate of the peneplain theory, and who has recently spent much time in the Canadian Selkirks, to which the the theory of peneplaination has been already applied. Dr. Daly still adheres to the peneplain theory as applied to some regions, but he finds difficulty in accepting it for lofty mountains. He states his belief "that further constructive work along the lines of the peneplain theory is at present not so necessary as a critical inquiry into alternative hypotheses." He proceeds to state an alternative hypothesis, consisting of a series of conditions which tend to bring about a rough accordance of summit levels among mountains. Among these conditions are original isostatic adjustment, later isostatic adjustment, the influence of metamorphism and intrusion, and subsequent differential erosion, due to a variety of conditions, which tend to lower the higher peaks faster than the lower ones. It seems to the reviewer that this alternative explanation is worthy of the most careful attention of physiographers. R. S. T.

A Study of Rubber Plants.—All who are especially interested in the rubber industry may desire to add to their libraries the valuable study by Mr. Peter Reintgen "Die Kautschukpflanzen," which has just been issued as a supplement to the monthly publication *Tropenpflanzer*. This industrial-geographical study has 218 pages, a list of books used, and a map showing the distribution of rubber plants. Part I gives a concise history of the discovery of rubber-yielding plants and of the scientific study of them, and deals with the physical and chemical nature of rubber and the present conditions and prospects of its cultivation. The larger part of the volume is given to the treatment in turn of all phases of the various rubber-yielding plants, including the conditions of their growth, their industrial importance, and the efforts thus far made to cultivate them. The plants are classed for this discussion in the three productive areas of America, Africa, and Asia-Australia. The statistics of the trade are given for each of these areas and the subdivisions of the rubber territory in them. It is noteworthy that the largest part of the literature on this subject has been produced in the past few years, since the suddenly-augmented importance of the industry gave it an impetus.

The Elisha Kent Kane Medal.—The Geographical Society of Philadelphia on May 3, awarded the Elisha Kent Kane Medal to Professor William B. Scott, Professor of Geology and Palaeontology in Princeton University. Professor Scott was editor and joint author of the Reports of the Princeton University expeditions to Patagonia.

Sverdrup Going to the West Indies.—The Arctic explorer, Captain Otto Sverdrup, is about to start for the West Indies to take charge of the work of a plant-

ing company. The condition of his health seemed to make it desirable to live for a while in a southern climate.—(*Allgemeine Zeitung.*)

M. VIDAL DE LA BLACHE HONORED.—This well-known French geographer, President of La Société de Topographie de France, has received the medal of the Paris Geographical Society in recognition of his work, "Tableau de la Géographie de la France," which is the introduction to the "Histoire de France," which is published under the direction of M. E. Lavisse.

M. LEVASSEUR BECOMES PRESIDENT OF THE COLLÈGE DE FRANCE.—This distinguished geographer and statistician has succeeded M. Gaston Paris at the head of the Collège de France. He has long been associated with its executive force, and was at the same time Professor of History, Economics, and Geography.

ANNUAIRE ASTRONOMIQUE POUR 1906.—This Annual, printed under the direction of Mr. G. Lecointe, has been issued by the Royal Observatory of Belgium since 1834. It not only contains tables and other information for the convenience of astronomers, but is also popularized by the inclusion of many elementary facts and explanations, so that it may be useful to the amateur and the general public. In the 388 pages are included, for 1906, the Gregorian, Julian, Jewish, and Mohammedan calendars, ephemerides for the sun, moon, and planets, eclipses and occultations, apparent positions of some of the stars, the tides, terrestrial magnetism, many astronomical tables, formulas, diagrams, etc.

FREDERIK MULLER & CO., Amsterdam, send one of their valuable catalogues, of more than 3,200 works, on Voyages, Discovery, Geography, and kindred subjects, selected and described, as always, with care and accuracy.

The catalogue is written in French, but the titles are given in the original languages.

IN AN EXCELLENT FRENCH TRANSLATION of Mr. Jeremiah Lynch's *Three Years in the Klondike*, published by Delagrave, Paris, the following note on page 44 bears testimony to the translator's acquaintance with Shakespeare and Keats, and his lack of familiarity with the slang term for *partner*:

1. *Pard*, appellation familière; exactement, *léopard*. (N. du tr).

NEW MAPS.

AFRICA.

AFRICA.—Carte des Missions Catholiques en Afrique. Scale, 1:10,000,000, or 157.8 statute miles to an inch. Supplement to *Les Missions Catholiques*, No. 1875. Lyons, 1905.

Shows the boundaries of the Vicarates, seats of the archbishops and bishops, the distribution of the mission stations, etc. A part of the sheet is filled with notes and tables, giving the condition of Roman Catholicism in Africa according to the official reports of the missions for 1904–05.

AMERICA.

UNITED STATES.—General Chart of Alaska. Scale, 40 statute miles to an inch. In *Reindeer Report* by Dr. Sheldon Jackson, Washington, D. C., 1905.

This map is based upon the post-route map issued by the Post Office Department.

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It shows the location of all post offices, public schools, and reindeer stations, and also the mission stations, indicating the denominations or sects to which they belong. The steamer routes are indicated with the number of round trips between various ports on each route during the season of navigation.

UNITED STATES.—Sketch Map of Reindeer Stations and Routes of Travel. Scale, 100 statute miles to an inch. Accompanying *Reindeer Report*, Washington, D. C., 1905.

Shows the existing reindeer stations, the proposed stations, and the routes of reindeer travel thus far outlined, and covering a large part of the territory north of Alaska Peninsula.

UNITED STATES.—Map of the Controller Bay Region, Alaska. Scale, 6.5 statute miles to an inch. *Bull.* No. 250, U.S. Geol. Surv., Washington, 1905.

Shows the petroleum field in the Controller Bay district and locates the development work.

UNITED STATES.—Geologic Reconnaissance Map of the Cook Inlet Petroleum Fields. Scale, 3.5 statute miles to an inch. Surveyed with traverse plane table by G. C. Martin. *Bull.* No. 250, U.S. Geol. Sur., Washington, 1905.

Denotes the geology in colours. Oil derricks are shown. The area carrying petroleum is dark shale with basal conglomerate and some sandstone and limestone.

UNITED STATES.—Sketch Map of Cold Bay Petroleum Field, Alaska. Scale, 18 statute miles to an inch. *Bull.* No. 250, U.S. Geol. Sur., Washington, 1905.

The above three maps illustrate *Bulletin* 250 on "The Petroleum Fields of the Pacific Coast of Alaska, with an Account of the Bering Sea Coal Deposits," by George C. Martin. This sketch of the Cold Bay field is a black map indicating the geology and the situation of the derricks and trails.

UNITED STATES—NORTH CAROLINA.—Oyster Chart of Newport and North Rivers, North Carolina. Containing the Data collected by the U.S. Fish Comm. Str. Fish Hawk during the Fall of 1899. Scale, 1 nautical mile to 2.43 inches. *Report* for 1903 of the U. S. Fish Commission, Washington, 1905.

Showing the location and extent of the natural oyster beds, areas of dense or scattered growth of oysters, artificial beds, and character of bottom.

UNITED STATES.—Geologic Atlas of the United States. No. 120. Silverton Folio. Colorado, 1905.

The descriptive text is 34 pages in length, making the folio unusually long. It deals with the district between 37° 45′ and 38° N. Lat. and 107° 30′ and 107° 45′ W. Long. (area, 235.66 square miles) in the famous San Juan mining region of South-western Colorado. The total production of metals in the Silverton quadrangle to the close of 1900 was at least $35,000,000, chiefly silver and lead. The topographic sheet shows the very rugged topography, with an average elevation of about 11,500 feet, with summits reaching above 14,000 feet, and Silverton, on the broad floodplain of the Animas River, the natural commercial centre of the district. A sheet of photographic illustrations shows landslide surfaces in the region of Red Mountain Creek, talus piles in Horseshoe Basin, rock stream in Silver Basin, torrential fans, and two fine views, one of them from Snowdon Peak.

CANADA.—Half Tide Chart Showing Greatest Strength of Flood and Ebb Corresponding to a Range of 24 Feet at St. John, N. B. Scale, 9 nautical miles to an inch. Tidal and Current Survey, Department of Marine, Ottawa, 1905.

The direction of the current and the strength in knots at half tide, flood, and ebb are shown.

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BOLIVIA.—Sketch Map illustrating the Explorations in Bolivia, by Dr. Steinmann, Dr. Hoek, and Dr. v. Bristram. Scale, 1:3,000,000, or 47.34 statute miles to an inch. The *Geog. Jour.*, May, 1905, London.

The map shows, as clearly as can be done on the small scale, the improvements added by this Exploration to the topographic delineation of a large part of western Bolivia. Corrections and additions to the earlier mapping have been made in these districts: The northern end of the Cordillera de Victoria; the Pampa de Tacsara, between Yavi and Tarija; the Cordillera de Liqui; the mountains in the east of Potosi, called the Cordillera de Potosi, and divided into the groups of Andacaba and Cari-Cari; the head of the Pilcomayo, between Mataca and Icla; the ranges of the Cerro Tunari, north-west of Cochabamba; the ranges of Santa Veracruz, Quimzacruz, and Araca, which form the continuation to the south of the Illimani group. The height of about 235 points was determined by aneroid checked by boiling-point thermometers. The latitude of a large nnmber of places in southern Bolivia was fixed, as also the longitude of Tarija and Potosi, the latter by telegraphic time signals from the observatory of Cordoba.

ASIA.

CHINA.—Sketch Map illustrating the journey of the Rev. J. Headley in the Chili Province. Scale, 1:750,000, or 11.83 statute miles to an inch. The *Geog. Jour.*, May, 1905, London.

Shows the route traversed for 550 miles to the northeast of Peking, with many new place-names.

TIBET.—Sketch Map of part of Tibet showing Route of the British Expedition to Lhasa, 1904. Scale, 1:1,500,000, or 23.7 statute miles to an inch. The *Geog. Jour.*, May, 1905, London.

Illustrating a paper by Sir Frank Younghusband on the geographical results of the mission. An important amount of detail as to topographic features on both sides of the route between the south border of Tibet and Lhasa is thus added to mapping facilities.

EAST INDIES ARCHIPELAGO.

TIMOR.—Karte van een gedeelte van het eiland Timor. Scale, 1:500,000, or 7.8 statute miles to an inch. *Tijdschrift* of the Royal Netherlands Geographical Society, Vol. 22, No. 3. Leiden, 1905.

Shows bridle and foot paths and rivers and was especially designed to show the boundaries between the Dutch and Portuguese districts according to the treaty of 1904.

EUROPE.

SWEDEN.—Djupkarta öfver Siljan. Scale, 1:200,000, or 3.1 statute miles to an inch. *Ymer*, Häft 1, 1905, Stockholm.

A bathymetrical map of this Swedish lake, with 4 tints showing the conformation of the lake-bed. Through the centre of the lake extends a long, very narrow trough, where the waters are over 100 metres deep.

ICELAND—DIE BRUCHLINIEN ISLANDS. Von Th. Thoroddsen. Scale, 1:2,300,000, or 36 statute miles to an inch. *Pet. Mitt.*, Vol. 51 (1905), No. 3. Justus Perthes, Gotha.

The map illustrates a paper by Dr. Thoroddsen on fault-lines in Iceland and their relation to the volcanoes. Lines of faulting and folding, fissures, lines along

which craters are developed, and volcanoes, ancient and post-glacial, are shown; also the areas subject to earthquakes. Appended to the map are 16 sketches showing some of the crater-forms in Iceland. The article is a concise discussion of the phenomena represented on the map. Dr. Thoroddsen is to develop the subject more exhaustively in a supplement to *Petermanns Mitteilungen.*

GENERAL.

STIELER'S HAND-ATLAS.—Neue neunte Lieferungs-Ausgabe. 100 Karten in Kupferstich. Lieferungen 45–46. Justus Perthes, Gotha, 1905. (Price, 60 pf. for each part containing 2 map sheets.)

Nos. 1 and 2 are new maps by Dr. Rohrbach of the Northern and Southern Constellations, distinguishing between the stars of different magnitudes, those that may be seen with the naked eye, small or large telescope, etc. Nos. 96 and 98 are sheets 2 and 4 of the revised 6-sheet map of South America.

WORLD.—Verbreitungsgebiet der Kautschukpflanzen. (Mercator Projection.) Beihefte zum *Tropenflanzer.* Vol. 6, No. 2/3 (May, 1905), Berlin.

Illustrates an industrial-geographical study by Peter Reintgen on rubber plants. The map distinguishes between the richest rubber regions, those where the crop is of some importance, and those where the plants exist, but not in commercial quantities. The entire rubber belt lies within the tropics, except that it pushes a little north of the Tropic of Cancer in British India.

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CORRY, JOSEPH.—Observations upon the Windward Coast of Africa, the Religion, Character, Customs, &c., of the Natives; &c., &c. (Map and 8 Plates.) London, G. and W. Nicol, 1807. 4to.

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EAST AFRICA, UGANDA AND ZANZIBAR. Handbook, 1905. (Map.] Mombasa [Gov't print.] 1905. 12mo.

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BOOK NOTICES.

Historia de las Guerras Civiles del Perú (1544-1548) y de Otros Sucesos de las Indias, por Pedro Gutierrez de Santa Clara. Tomos 1 y 2. (Colección de Libros y Documentos referentes á la Historia de América.) Victoriano Suárez, Madrid, 1904.

The veritable title given by Pedro Gutierrez de Santa Clara to his five books, only two of which are as yet published, is: "*Quinquenarios*, and he qualifies the civil wars in Perú as "*guerras mas que ciuiles que uvo en los reynos y prouincias del Perú.*" It might have been more appropriate to apply to these disturbances the epithet of "less than civil." As it is, there are as yet only two books of this interesting work in print, and it is enough to make us yearn for the rest. To review the *beginning* of a work is a very delicate task.

Many, and quite important, matters are foreshadowed in that beginning. We learn, from references in the elaborate introduction, that the third, the fourth, and especially the fifth book contain the most interesting, or, at least, the most attractive data. Some conclusions of the introduction are held in suspense, as we have not the final word of proof which the unprinted sections contain. At any rate, the remaining volumes, it is to be hoped, will soon make their appearance, and until then it is a pleasant duty to congratulate the Spanish editor on what he has attempted and performed. He has opened to study a new source on the history of the colonization of Peru in its earliest period, and it may be also a valuable contribution to the knowledge of primitive conditions. This, as well as the importance of the work for Mexico, remains yet to be seen.

Very naturally, the person of the author, *who* and *what* he was, occupies a great portion of the introduction. It is not easy to find a needle in a haystack, and therefore, where men called *Gutierrez* abound, and each one of them is adorned with as little genealogy as possible, the pedigree of one of them named Pedro is hard to trace. The editor has, therefore, attached himself to the appendix *Santa Clara*, in

the hope of finding some clue among those Spaniards who were in America at the time and bearing that name. That our Pedro was not born in Spain, but in the new continent, seems certain. He says this himself. But while Santa Clara may have been his father's name, the thought should not be discarded of Santa Clara having been the name of his *mother*, and her *maiden name*, too. There are many such instances on record when the maternal appellative was substituted for the paternal without the usual "y" being interjected. Witness, for instance, Alvar Nuñez Cabeza de Vaca, Castillo, Maldonado, and many others of the time. On this point it is, however, useless to dwell at length, since the material furnished by the two volumes is not sufficient. Suffice it to know that Gutierrez claims to have been present at most of the occurrences related by him, which makes of his writings a source of high respectability.

There is, however, a wide step from this deserved acknowledgment to the sweeping assertion made by the editor, that the work of Gutierrez de Santa Clara is the *only one* written on the subject by an eyewitness. This statement might be pardonable coming from a reviewer, or some so-called historian on our side of the water, but from a Spaniard of learning, like the editor, it is very surprising. If Pedro Gutierrez was the "only" eyewitness of the "more than civil wars" in Peru, where was Agustin de Zárate at the time? Where Pedro Pizarro? or Alonzo de Montemayor, whose narrative Oviedo carefully preserved and rendered? Where was Nicolas de Albenina, whose little book exists, if in but a single copy, at Paris? All these men were in Peru at the time, and took part in the very "uncivil" disturbances of the period. Zárate was one of the highest of royal officers, and Montemayor also occupied a position much above that of any private soldier, like Cieza or Gutierrez, and they were able to look at events from a much higher level. The "Quinquenarios" are an invaluable check upon the statements of these sources, but only a check, and not the final word, the source *par excellence*. If Gutierrez is an indispensable check on the writings of his contemporaries they are the same to his, and the German proverb should be taken as a rule in every historical undertaking:

"Eines Mannes Rede, ist keines Mannes Rede;
"Man muss sie hoeren Alle Beede."

It is certain that Gutierrez, as far as we are able to judge, is a very loquacious writer of minute details. Yet he is not a gossiper. And he tries as hard as he can to be impartial, in spite of his unflinching adherence to the cause of the Crown. It was not easy, under the circumstances, to be faithful in deeds and impartial in opinion. Gutierrez, for instance, gives a picture of Blasco Nuñez de Vela, the stiff-necked executor of the laws, framed under the influence of the fanatics, and impracticable as Casas, which is inestimable for truth and actuality. He paints with a master hand that man, imbued with but one idea and deaf to all counsels of prudence, driven to murder by his own blindness, and finally rushing into his well-merited destruction. So far as we can judge, his portrait of Gonzalo Pizarro will not be as good, and for two reasons; he had not, with Pizarro, the same contact as with Nuñez de Vela, and he was on the king's side. In this, again, we must wait for the closing volumes before expressing a final opinion.

Whereas most authors of his time on America introduce their narrative with at least a few geographic data, we look in vain for such in Gutierrez. Neither is there anything of great geographic importance in the two volumes. He begins his story with a brief biographic reference to Las Casas, and what he says concerning that inconsiderate zealot's attempt at Cumaná is very true. He justly recognizes in Las

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Casas the source of all the evil that flooded Perú in the middle of the sixteenth century, and the greatest enemy the Indians ever had. He does not say this in so many words, but he leaves the reader to understand it from the facts related.

The absence of geographical information applies only to the two volumes before us. From references to the three volumes that will follow we conclude that especially the last (fifth) book will make up for the deficiency. Let us hope that the remainder of the work may soon appear in print.

The typography is commendable. The samples of the handwriting (two of which are of a geographic nature, and give a fair idea of the settlements along the western coast of America, north and south) are quite interesting. For his time, Gutierrez wrote a very clear and exceedingly legible hand. It must be said, also, that Gutierrez, after his return to Mexico, continued to work on his narratives, and that they were probably finished only in the first years of the seventeenth century. He also claims to have written a book under the title of *Colloquios*, the whereabouts of which is still unknown.

Let us hope that the publication of ancient texts relative to Spanish America, in which work Spain is justly foremost, will give us at last some of the more important manuscripts which are still unpublished. There exists, for instance, in private hands at Madrid, the third part of the Chronicle of Cieza, which is invaluable for Peru and its primitive condition. The *Epítome del Nuevo Reyno de Granada*, by the conqueror, Gonzalo Jiminez de Quesada, written in 1539, also exists in the Archives of Madrid. So does the remarkable description of Peru, as far as the jurisdiction of Almagro extended, in 1539, by Father Cristóval de Molina. The time for "Columbiana" is about over; they have ruled long enough. Let Americana of the sixteenth century have their chance also, to be presented to the student in an accurate and accessible form, as they have always come to us from Spain.

A. F. B.

Il Tibet (Geografia, Storia, Religione, Costumi) secondo la Relazione del Viaggio del P. Ippolito Desideri (1715-1721). By Carlo Puini. lxiv and 402 pages, Appendices and Index. Italian Geographical Society, Rome, 1904.

Prof. Carlo Puini rediscovered, in 1875, the long-forgotten manuscript "Ragguaglio," in which the Jesuit Father Desideri gave a description of his travels and missionary work in Persia, Kashmir, the Moghul Empire and Great and Little Tibet, in the early part of the eighteenth century. He lived for six years in Lhasa—a longer time than any other European has ever spent there. The manuscript was rediscovered at Pistoia in the library of Cavaliere Rossi-Cassigoli, who, however, refused to permit Prof. Puini to publish the valuable document, as he hoped to sell it to the Hakluyt Society, to be published in English. This arrangement was not completed, however—perhaps on account of the death of the owner. It was not till 1901 that the Italian Geographical Society gave assistance that enabled Prof. Puini to publish a part of the work.

The portion now printed is confined to the sections on Tibet, is a little less than half of the manuscript, and the more valuable part of it. Nearly half of the book deals with Tibetan Buddhism and Lamaism, with the strange religious systems that preceded them. As all other matters relating to Tibet are now better understood than the religions that for many ages enchained it and stifled all progress, the account that Desideri wrote of them, qualified as he was by intellectual equipment and thorough acquaintance with the Tibetan language, will be especially valuable to students of this phase of Asiatic history.

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A Norwegian Ramble. By One of the Ramblers. xi and 232 pp. and 16 half-tone illustrations. G. P. Putnam's Sons, New York, 1904.

A book handsomely printed and convenient for the pocket. It takes the reader away from the beaten paths to the fiords and mountains of southwestern Norway, where the weary may find rest and recreation among innumerable waterfalls, lakes, and snow-crowned heights. The author shows, both with pen and picture, that this region offers extraordinary attractions, and he is very appreciative of the kindly, hospitable and honest folk living amid these surroundings. But if Nature is lavish of her beauty and grandeur, the soil is niggardly:

> Every square yard of ground capable of producing grass is mown twice during the season and infinite care is taken in curing the crop. Everything else that can possibly be used for fodder is also saved with scrupulous economy. Thus the ash trees are shorn of all their lower leaves and branches and the potato tops, when they reach their full growth, are also cut, and both these and the ash leaves are dried upon the hurdles in the same manner as the grass.

The Far Eastern Tropics. Studies in the Administration of Tropical Dependencies in the Far East. By Alleyne Ireland. vii and 339 pp., Statistical and Biographical Appendices, Index and Map. Boston, Houghton, Mifflin & Co., 1905.

Mr. Alleyne Ireland, who has been devoting himself to a study of the forms of government and the conditions of labour in the tropics, and who has already written several articles and at least one book on these general subjects, has now published this volume. He rightly lays much emphasis upon the climatic control of government in the tropics; in fact, his whole discussion may be said to rest upon climatic considerations. The mean annual isotherms of 68°, which are taken as the limits of the heat belt, bound the region in which Mr. Ireland sees a stationary civilization, and not a single contribution of first importance to art, literature, science, manufacture, or invention. The author notes that in early times man did progress within the tropics, but that the real advance has come under more harsh conditions in the so-called "temperate" zone. To quote:

> The history of western civilization is the history of man's emancipation from the tyranny of his surroundings. That of tropical civilization is the record of his enslavement. The significance of this antithesis lies in the fact that, whereas in tropical civilization each succeeding nation, by building up a heritage of increasing weakness and dependence, wrote failure in ever-darkening letters across the page of history, each hour of western civilization marked some advance and yielded to man some new augmentation of his powers.

Mr. Ireland believes that the development of tropical peoples "has reached the limits imposed by inexorable natural laws"; that the greatest success in administering tropical possessions has been attained by those northern nations which realize that the natives of the tropics are and must remain dependent people, who cannot take a controlling part in government patterned after the forms familiar in extra-tropical countries. To expect that the natives of the tropics will become fit for self-government in the Western sense seems to Mr. Ireland "beyond any flight of an imagination which is checked by the smallest knowledge of tropical life."

Doubtless the very decided views taken by Mr. Ireland in his latest book will meet with severe criticism, and doubtless he goes too far in some things. But, on the other hand, climate is a natural control which is extremely powerful, and it is a control which few persons have so far thoroughly appreciated. For a temperate discussion of the influence of climate upon government reference may be made to a paper by Hon. James Bryce in *The Century* for March, 1899 (*British Experience in the Government of Colonies*).

R. DEC. W.

XUM

Die Aenderung des Projektionssystems der schweizerischen Landesvermessung. Bern, 1903. 8vo, 117 pp., V tables, and map.

This work has for its underlying object the mathematical presentation of a new system of projection which is adaptable to the construction of the topographic map of Switzerland. In connection with the discussion of the proposition for the introduction of the new system, the principles of the projections that have been developed since the beginning of the nineteenth century, for the purposes of topographical mapping, are set forth; and a summary statement is made of the projections that are employed at the present time in the different countries.

The essential part of the book is that part which is devoted to the development of the principles of the new system of projection under the heading "The oblique axis cylindric-projection with preserved angles, and its application to Switzerland."

Switzerland is of an extent a little less than two degrees in latitude and a little more than four degrees in longitude, as shown by the map which accompanies the work to illustrate the various projection systems which have been applied by that country. The centre or zero point of the projection is taken at Bern, which is in the western central portion of the country. Bessel's dimensions of the terrestrial spheroid are accepted.

Formulæ for the transfer from a spheroidal surface to that of a spherical surface are first developed: The condition that a differential triangle, in being transferred from the spheroid to the sphere with preserved angles, carries with it the further condition that the ratio of any two sides of the triangle of the spheroid equals the ratio of the corresponding two sides when transferred to the sphere; also, on account of the conditions of conformity, the meridians of the spheroid and sphere cut the corresponding parallel circles at right angles, and $\frac{dl}{dL}$ the ratio of the distance between two meridians on the spheroid to the corresponding distance on the sphere is constant and independent of the latitude. Making use of these principals, the required formulæ are deduced.

By these formulæ the latitude and longitude of a position on the sphere are deduced from the latitude and longitude of the corresponding position on the spheroid. Also the azimuth of a line on the sphere is determined from the azimuth of the corresponding line on the spheroid, and the magnification ratio of the length of a great circle arc on the sphere to the length of the geodetic line on the spheroid is found.

After the completion of the transfer from the spheroid to the sphere, formulæ are developed for the purpose of making a further transfer from the sphere to the plane under the restriction that angles are still to be preserved. First, the latitude and longitude of a position on the sphere being assumed, the spherical co-ordinates y and x are determined with reference to the zero meridian and the great circle normal to it through the zero point of the chart. This latter circle is called the base circle. From y, x, the plane co-ordinates y', x' are determined in the oblique axis cylindric-projection system. Conversely y', x' being given, formulæ are derived giving y, x.

The angle formed by a great circle perpendicular to the base circle and a meridian is called the meridian convergence for the point of intersection. This angle is represented in the plane by the angle between the projected meridian through the point and a parallel to the x axis or the projected zero meridian. The value of the meridian convergence is derived in terms of y', x'.

The azimuth reduction and the magnification ratio being deduced, the work closes with some examples applying the method to the transference, first from the spheroid to the sphere, and then from the sphere to the plane. G. W. L.

Thomas Hutchins. A Topographical Description of Virginia, Pennsylvania, Maryland, and North Carolina. Reprinted from the original edition of 1778. Edited by Frederick Charles Hicks. The Burrows Brothers Company, Cleveland, 1904.

Mr. Hicks has made scholarly use of the opportunity which he had for several years as a member of the staff of the Congressional Library. He introduces Hutchins' narrative with an interesting and extended biographical sketch (45 pp.), with many citations of authorities. Hutchins' career was unique in that he alone has held the office of Geographer of the United States. He was born in New Jersey in 1730, and after coming to maturity served more than twenty years as a British officer. He was stationed at Fort Pitt in 1759, and he acted as engineer in various operations and explorations on the frontier, including supervision of public works in Florida and Louisiana.

He was in London at the outbreak of the war with the Colonies. He was imprisoned, being charged with treason, and suffered great financial losses for his unflinching loyalty to the land of his birth. He was held in high regard by such men as Franklin and Washington, and was appointed Geographer to the United States of America in 1781.

Hutchins executed surveys for roads and boundaries, and was engaged in the examination of sites for a national capital. He was one of a commission to run the western part of the boundary between Pennsylvania and Virginia, and thus completed the location of the famous Mason and Dixon's line.

Much honour is ascribed to him for his part in working out methods of dividing the public lands. He conducted many surveys in the western wilderness, and is characterized by the editor as holding a place among "the great American civilizers." The sketch is followed by a list of Hutchins' works and the reprint of the topographical description. In pocket is a reprint of his map, first published in London in 1778, "A new Map of the Western parts of Virginia, Maryland, and North Carolina." A. P. B.

Dalmatien und Montenegro. Reise und- Kulturbilder. Von L. Passarge. 341 pp. B. Elischer, Leipzig, 1904. (Price, M. 6.)

Like all the earlier travel descriptions by this writer, the book gives a series of entertaining pen-pictures of the regions described. It takes the reader along the short Hungarian shore-line and the coast of Dalmatia to its southernmost point. An excursion inland gives many glimpses of the interior of Montenegro; and with the pictures and impressions of the present time, the author sketches the past of the same regions, many an old ruin or hoary document helping him to indicate the various stages of culture through which these people have passed. Books like this tend to stimulate travel in the regions described, and assist the visitor to enlarge his understanding of the influences that have shaped the civilization of a country.

Problems of the Panama Canal. By Brig. Gen. Henry L. Abbot, U. S. Army, Retired. xl and 248 pp., Map of the Route, 15 diagrams, Appendix and Index. The Macmillan Company, New York, 1905. (Price, $1.50.)

The book sets forth the views of Gen. Abbot as to the work done on the Panama Canal and what steps should be taken to complete it. As Gen. Abbot was engaged for seven years in a technical study of the Panama problem and dealt with many large public works during his long career in the Engineer Corps of the Army, his opinion on the great enterprise at the Isthmus will command much attention. Of

large geographical interest is his extended treatment of the physical conditions, including climate, concerning which, he says, much wild exaggeration has been circulated, though no one will assert that the climate of the Isthmus is salubrious. He discusses the engineering problems and the various projects for completing the canal. He is not in favour of a sea-level canal, and he says in his final chapter:

> It is the unanimous opinion of all the engineers who have had practical experience in canal work and time to thoroughly study the problem, that no sea-level *projet* without locks, and no sea-level canal even with a tidal lock, is practicable that would be comparable in ease and safety of transit to one equipped with modern locks and planned to take advantage of all the desirable elements which the natural conditions offer.

The Complete Pocket Guide to Europe. Edited by Edmund C. Stedman and Thomas L. Stedman. xxxi and 505 pp., 5 Maps, 4 Plans and Index to Places. William R. Jenkins, New York, 1905.

A new edition of this well-known "handy volume," which may still be carried in a man's pocket, thanks to the determination of the editors to keep it within the original size. It contains much condensed information, without justifying its claim to completeness. In a small book covering so much ground most attractions can merely be pointed out; but there is descriptive matter for the leading show-places. The commonplace railroad map of Europe is not worthy of the book. To specify only one or two of its shortcomings, Constantinople is not named, and the reader might easily get the impression that there is no direct rail communication between St. Petersburg and Warsaw, the third largest city of the Russian Empire.

The East Africa Protectorate. By Sir Charles Eliot. xii and 334 pp., 31 illustrations, 2 Maps, Appendices and Index. Edward Arnold, London, and Longmans, Green & Co., New York, 1905. (Price, $5.)

Sir Charles Eliot was recently Commissioner for this Protectorate, which, roughly speaking, embraces the territory between the Victoria Nyanza and the Indian Ocean. This region is especially noteworthy because it offers opportunities for European colonization under the tropical sun. Until recently, however, knowledge of the country, as a whole, has been fragmentary and inadequate. The appearance of this book, dealing with all its important aspects and written by a former official who is most competent to treat the subject, is an interesting geographical event.

Sir Charles was sceptical as to the reports that there are wide areas perfectly adapted for occupancy by white farmers, until long investigation and experiment proved the statements to be true:

> Much of the territory is still imperfectly known, and even those who have claims to special knowledge are continually surprised by the discovery of new districts, healthy, fertile, and suitable as a residence for Europeans. In this year, though six weeks of it have not yet elapsed, I have received reports of two such districts in parts of the Protectorate which were supposed to be barren, one in the north of the Rift Valley, and one near the western extremity of the German boundary.

The first eight chapters are given to a historical retrospect, a description of the geography of the coast lands, the interior and the remarkable highlands where the conditions favour white colonization, and to a most valuable account of the Swahilis, Somalis, Bantu-speaking and other tribes.

In three chapters devoted to East Africa as a European colony, the author says that the lower parts of East Africa are planters' countries, where Europeans may superintend plantations but cannot reside permanently. The coasts of the African mainland are, with a few exceptions, the best of these districts. The worst parts are the shores of Victoria Nyanza and some swampy places on the coasts.

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On the other hand, the Highlands (5,000 to 10,000 feet high) are a region in which the whites may thrive and multiply, as has been proved by the experience of fifteen years. There is now a steady influx of English-speaking settlers, due to the railroad, which makes it easy to reach the highlands. The immigration has been a source of embarrassment, because the settlers arrived before surveys had been made and land laws adopted. These difficulties have not yet been entirely remedied.

The natives must be protected and assured of sufficient land for their needs, but the paucity of native population simplifies the question of white immigration. Sir Charles describes the existing system of administering the Protectorate, suggests methods of improving the Government, and supplies chapters on the railroad between Mombasa and Uganda, commerce, slavery, missions, and a journey down the Nile, the whole forming a comprehensive and valuable account of a region that until 21 years ago had never been crossed by a white man.

Relación de las Misiones de la Compañía de Jesús en el País de los Maynas. Por el P. Francisco de Figueroa. Madrid, Victoriano Suárez, 1904. (Colección de Libros y Documentos referentes á la Historia de América. Tomo I.)

After the publication, by the Peruvian Government and in the "*Revista de Archivos y Bibliotecas nacionales*" (Sept. to last of Dec., 1899), of the documents relative to the reduction and pacification of the forest Indians on the Peruvian side of the upper Amazon, between the years 1643 and 1659, this volume on the Missions of the Marañon appears timely. It completes the former. The appendix, furthermore, contains three documents which bring down information on these Missions to the year 1738, at least. Together with the works published before in Spain (or rather reprinted), like that of Father Cristóval de Acuña from 1641, the "*Nuevo Descubrimiento del rio de Marañon, etc.*," by the Franciscans Fr. Laureano de la Cruz and Fr. Juan de Quincocos, written in 1653, and the valuable documents which the late Don Marcos Jiménez de la Espada published in Vol. IV of his "*Relaciónes geográficas de Indias*," it nearly completes the set of principal sources on missions and explorations of that wild and barely penetrable region in which the Jesuits performed their monumental labours among the South American aborigines, not to omit, as belonging to the same kind of literature, what is preserved about the work of Father Samuel Fritz, S.J., in the "*Lettres édifiantes et curieuses*" and the "*Newe Welbott*" of Father Strecklein.

Not saying it in disparagement of other Orders, it must be conceded that geography owes a special debt of gratitude to the old Jesuit missionaries. We take geography in the widest sense of the term, as embracing Natural History and Anthropology. This is well exemplified, again, in the "*Relación*" of Father Figueroa, particularly in Nos. XII to XXII, which furnish a description of the region and what it contains. The value of the specific training received by the members of the "Company of Jesus," after individual inclinations and aptitudes have been thoroughly probed and developed, is placed in proper relief through such narratives. We, of course, meet, now and then, with misstatements, with utterly unfounded stories; but no blame can be attached to the devoted priests for repeating the errors of their time. The picture of the aborigines is far from appealing to our sympathies, and one can but pity, and admire at the same time, the untiring missionaries. A most valuable contribution is the minute location of tribes or bands in the middle of the seventeenth century; and, while the (unostentatious) narratives of vicissitudes are necessarily prolix, and religious enthusiasm is strongly prominent, these very *faits et gestes*

impart a wealth of geographic information. Thus the exceedingly complicated network of water-courses on the north side of the Marañon has much and new light thrown upon its confused and entangled channels by the simple story of the monks' peregrinations; on water (paddling up or down the numberless streams), or on land by cutting their way across from river to river, through the almost impenetrable forest. This applies as well to the documents forming the appendix, written in the same spirit, and imparting information of the same nature.

Of the introduction not much need be said. It fits the subject, and, while not complete in its bibliography, is still fairly ample. The editors and publishers can but be congratulated on the issue of such interesting and hitherto hardly accessible matter bearing upon South American topics and upon regions the industrial importance of which is becoming gradually recognized. A. F. B.

Deutsches Kolonial-Handbuch. Nach amtlichen Quellen bearbeitet von Dr. Rudolf Fitzner. Vol. I (Second Edition), viii and 412 pp., 8 Maps and Index, 1901; Vol. 2 (Second Edition), iv and 267 pp., 2 Maps and Index, 1901; with Ergänzungsband, 1904. Hermann Paetel, Berlin. (Price, M. 8 for the three volumes.)

In Germany, a standard work of reference relating to the colonies. The two initial volumes give much detailed and carefully-compiled information relating to the geography, government, trade, commercial and planting companies, and other features of each of the German colonies. Supplementary numbers bring the information down to date without reprinting the general facts of more or less permanent value. Among the various kinds of information are the names, residence, and occupation of all colonists and officials.

Among the Burmans. A Record of Fifteen Years of Work and its Fruitage. By Henry Park Cochrane. 281 pp., and 19 Illustrations from Photographs. Fleming H. Revell Company, New York and Chicago, 1905.

Dr. Cochrane has endeavoured to give a true picture of life and conditions in Burma. He describes the first impressions and experiences of the foreigner, the every day life of the natives, their customs, religion and races, the obstacles in the way of development from the Western point of view, and the progress of missionary effort. Anecdotes and concrete illustrations give vividness to the narrative, and the style is entertaining. Of the difficulties of acquiring the Burmese language the author says:

> The construction of a Burmese sentence is the reverse of the English order. Many sentences may be translated backward, word for word, certain connecting particles becoming relative pronouns, with a perfect idiomatic English sentence as the result. The eye can soon be trained to take in a printed sentence as a whole and grasp its meaning without stopping to render it into English in the reversed order. But to keep this order in mind, in conversation, with the word expressing action left for the last, like the snapper to a whip, is not so easy.

The long chapter on the chief races gives the characteristics and an outline of the history of each of the peoples. The book, though written from the missionary standpoint, is a good, popular account of the country and its inhabitants.

The Exploration of Tibet. Its History and Particulars from 1623 to 1904. By Graham Sandberg. vi and 324 pp., Map of Tibet and Plan of Lhasa (in pocket) and Index. Thacker, Spink & Co., Calcutta, and W. Thacker & Co., London, 1904.

When Mr. Clements R. Markham published in 1876 his narratives of the mission

of Bogle to Tibet and the journey of Manning to Lhasa, he also collected for the volume all that was known of the geography of that country and of the geographical work done there up to that time. This well-known work has since then been the best book of reference in matters relating to Tibet for the period covered. Mr. Sandberg's book not only supplements Markham's volume for the later years, but also remedies its deficiencies by the use of material that existed, but was not accessible, when Markham wrote.

The book is a concise exposition of the geography and exploration of Tibet from the travellers of the Middle Ages (who brought news of the country, though they did not enter it) to the British expedition of last year. The author had special advantages for treating such phases of the work as the explorations of the Indian surveyors; and he gives more space than has hitherto been done in English to narratives of travel that are least known to the public, such as the annals of the Capuchin missions of the eighteenth century. One of these recitals, recording the journey to Lhasa and residence there of one of the missionaries, was discovered in an Italian library three years ago, and now first appears in English.

Chronological order has been strictly observed in this very painstaking summary, which may be welcomed, not only as a complete source of reference, but also as a readable and connected history of an important chain of events. The map is a good one, though its accurate information is rather crudely presented, and it lacks some desirable details supplied by the special map of the Royal Geographical Society.

"Verb. Sap." on going to West Africa, Northern and Southern Nigeria and to the Coasts. By Alan Field. 166 pp., Illustrations, Map and Index. John Bale, Sons & Danielsson, Ltd., London, 1905. (Price, 2s. 6d. net.)

A chatty little volume, giving the results of experience as to the outfit for a white person who is going to the west coast of Africa, and the kind of life he should lead there to diminish the climatic dangers. The book is undoubtedly of practical importance to those who go on this journey. The white races are just beginning to understand the art of outfitting for these regions and of living in them. Among the thousand-and-one hints in this small book some are likely to be of priceless value to white strangers in West Africa.

Incidentally much information is given about those countries. The author says Sierra Leone is pronounced as though spelled Salleone; and the names of some of the coast towns, as Accra, Grand Bassam, and Axim, have the emphasis on the last syllable.

Souvenirs Entomologiques. Études sur l'Instinct et les Mœurs des Insectes. (Neuvième Série.) Par J. Henri Fabre. 375 pp. and Illustrations. Librairie Ch. Delagrave, Paris, 1904 (?). (Price, 3.50 fr.)

This is the ninth volume in a series of studies of the instinct and habits of insects which has achieved general popularity in France, and has earned as well the commendation of entomologists. The author has a gift of patient observation and a pleasant way of telling of the discoveries that may reward the weeks and months spent in studying the animals of a single species. The daily life of some kinds of spiders, beetles, scorpions, and other insects is described in the present volume.

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Dänemarks Natur und Volk. Eine Geographische Monographie. Von Dr. E. Löffler. iv and 119 pp., 39 Illustrations and Maps, Bibliography and Index. Lehmann & Stages Verlag, Copenhagen, 1905.

Gives a good general picture of Denmark, the Faroe Islands, and Iceland. The author is Professor of Geography in the University of Copenhagen. His treatment of the physical geography is in the approved German manner, and his general description of the islands and their inhabitants is much in the style of Reclus. His work is purely geographical, and does not deal with the economic aspects of the kingdom.

Landscape in History, and other Essays. By Sir Archibald Geikie. viii and 352 pp. The Macmillan Company, New York, 1905. (Price, 8s. 6d.)

This volume is a collection of essays and addresses which have appeared in various publications since Sir Archibald's delightful work, "Geological Essays at Home and Abroad," was given to the public. For years the author has given much study to scenery in its geological relations and its influence on human progress, and the first four essays in his present work deal with landscape in its relations to history, the imagination and literature, and with the origin of the scenery of the British Islands. Other chapters treat of Hutton's "Theory of the Earth," which gave an impetus to studies that evolved the modern science of geology—the age of the earth, the place of science in modern education, and the work and influence of Darwin and Hugh Miller. Thus the book deals largely with physical geography and the sciences related to it. Sir Archibald Geikie is one among those leaders of scientific thought who possess imagination and the charm of an attractive literary style, and these essays fully sustain the reputation he has acquired for his ability to interest a very wide public in the study of the face and the structure of the earth.

Ostasiatische Skizzen. Von Pauline Gräfin Montgelas. 105 pp. and 1 Illustration. Theodor Ackermann, Munich, 1905. (Price, M. 2.)

The author travelled widely in Eastern Asia in 1900-1903, under auspices that opened to her official doors and gave her unusual opportunities. These many sketches, all short and some of them under a page in length, offer nothing new to geographers, but their merit is something more than that of merely good reading. Countess Montgelas has the art of seizing promptly upon the point or the impression she wishes to make, and, having made it, she drops the subject. There is very little waste language, and the bits of information or description are vivid and full of local atmosphere. There is little doubt that many who are very well read in the literature relating to China proper, Japan, Corea, Mongolia, and Manchuria will find some new points of view and suggestive information in these sketches, slight as they are.

Countess Montgelas was one of the guests at the reception given by the Dowager Empress of China to the ladies of the foreign legations when, after her Majesty had assured the ladies that thenceforth they would all be the very best of friends, the wife of the American representative ventured to remind her hostess that she had given them the same assurance before the Boxer troubles, but that since then they had been penned up in Peking and shot at by her Majesty's subjects.

Highways and Byways in Derbyshire. By J. B. Firth. xvii and 500 pp., 74 Illustrations by Nelly Erichsen, 9 Maps and Index. The Macmillan Company, New York, 1905. (Price, $2.)

This is not a guide-book. It does not deal with show-places or describe scenery,

but it gives the literary and historical associations of Derbyshire, and thus supplies the human interest that adds so much to the enjoyment of travel. Others may describe the country town of Ashbourne, one of the pleasantest in England. But Ashbourne not only stands at the gate of exquisite scenery ; it is also filled with the memories of great men. The book tells, for instance, of Dr. Samuel Johnson, who used to spend his holidays here with his lifelong friend Dr. Taylor, whose house is still the best private residence in the town. Dr. Taylor seems to have been a sly humourist; and we read that once when he expected the Duke of Devonshire to dine with him, "he gave orders that his Grace was to be driven twice round the grounds, so that he might imagine the garden was twice its real size."

The little town, also, has reminiscences of Tom Moore, of Samuel Rogers the banker-poet, and others. This was George Eliot's country, and those who wish to identify the places named in *Adam Bede* will not err, says Mr. Firth, if they interpret Oakbourne as Ashbourne, Snowfield as Wirksworth, Eagledale as Dovedale, Norbourne as Norbury.

It was in Derbyshire that Jean Jacques Rousseau began to write his famous *Confessions*. The wealth of reminiscence and anecdote concerning many interesting people will be appreciated most of all by those who visit England. The illustrations add greatly to the book.

Wirtschaftliche, naturgeschichtliche und klimatologische Abhandlungen aus Paraguay. Von H. Mangels. viii and 364 pp. and Illustrations from Photographs. Verlagsanstalt Dr. Fr. p. Datterer & Cie, Munich, 1904. (Price, M. 6.75.)

A number of German settlers in Paraguay undertook, in 1894, the publication of a weekly journal, *Paraguay Rundschau*, in the German language, in order to disseminate accurate information about the country. This journal still appears regularly in enlarged and improved form, and it is deservedly prized by all who are especially interested in the colonization of Paraguay and the development of its agricultural resources and commerce. Among the friends who contributed largely to its columns, though it could not afford to pay them for their work, was the author of this volume, long the German Consul at Asuncion.

The book is made up of the articles, revised and brought up to date, which Mr. Mangels originally wrote for the *Rundschau*. They are based upon his long experience and studies in the country, and bring together a large variety of information not yet easy to find ; for the literature relating to the geography and development of Paraguay is not yet rich.

A chapter is given to agriculture and colonization in Spanish South America and the various colonial undertakings in Paraguay, and in others the climate, soils, economic plants, most important forest trees, crops, rubber-planting, poisonous and other obnoxious plants, fertilizers, and many other topics are treated. These contributions make a desirable volume.

La Picardie et les Regions voisines: Artois, Cambrésis, Beauvaisis. Par Albert Demangeon. 496 pp., 34 half-tone Illustrations, 50 Maps, and Bibliography. Librairie Armand Colin, Paris, 1905. (Price, 12 frs.)

A geographical study of the Picardy Plain, in northeast France. Picardy, with the neighbouring regions, forms a geographic entity facing areas on all sides that are topographically distant from it. Its aspect seldom varies, for throughout the plain are found about the same relief—rivers, soils, fields, and villages. But if the plain

has no very strong contrasts, and few show-places with which to astonish the tourist, it has a quaint and pleasing expression of its own, largely stamped upon it by its people, who rescued the inundated coast from the sea, fixed its sands, regenerated the soil by ingenuity and toil, and gave to most of the settlements the character rather of agricultural market-places than of busy towns.

Dr. Demangeon has done good service by his careful study of so unique a region, whose natural or human characteristics he describes and in many cases explains. The pictures, all from his own photographs, are excellent, and the numerous small black-and-white maps are helpful to the text. On the coloured map of the Picardy coast a curious discordance is explained in this way: It was made from a Government map, the northern part of which was revised in 1898 and the southern part in 1890. The two parts thus brought together in one map differ widely in the positions assigned to sandbanks and channels in the Baie de Somme, proving great instability in the submarine contours of that bay.

Bericht über die neuere Literatur zur deutschen Landeskunde. Bd. II (1900 und 1901). Im Auftrag der Zentralkommission für wissenschaftliche Landeskunde von Deutschland herausgegeben von Prof. Dr. Alfred Kirchhoff und Prof. Dr. Fritz Regel. viii and 413 pp., with Index of Authors. Ferdinand Hirt, Breslau, 1904. (Price, M. 12.)

The first volume of this bibliography was published in 1901, and contained titles of and comments upon 952 geographical works relating to Germany and published in the four years 1896–99. In the second volume now before us, Dr. Regel has succeeded Dr. K. Hassert as joint editor with Dr. Kirchhoff, large collaboration among German geographers has been secured, and the number of titles of books, monographs, maps, etc., has been increased to about 2,000, though the period covered is only two years. The book is not unwieldy, because the explanations and comments added to the titles are short as compared with those in the first volume. On the whole, this change is probably desirable, for it facilitates reference by reducing bulk. A bibliography is valuable in proportion to its completeness as a directory; and summaries of contents, and especially criticism, may usually be left to the review departments of the critical journals.

These 2,000 items are admirably arranged in chief classifications and groups under them. If we wish, for example, to learn what was written in 1900 and 1901 on the interior waters of Germany in all their phases, we find these topics grouped in "Die Gewässer" under the larger classification "Das Land," and find that these titles appear between pp. 86 and 87. The whole field is covered under 4 large divisions, with 25 subordinate groups.

It is easy to see how helpful such exhaustive compilations may be in the examination of any phase of German geography. They are essential in a country the study of whose geography has been so minute and many-sided. The Germans excel not only in applying their superior geographic training to the study of their own land, but also in the thorough classification of the knowledge they have gained, as exemplified in this bibliography.

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